

UNIVERSITY OF GHANA
COLLEGE OF AGRICULTURE AND CONSUMER SCIENCES
DEPARTMENT OF AGRICULTURAL EXTENSION

**GENDER AND ACCESS TO AGRICULTURAL RESOURCES IN THE
SUDAN AND GUINEA SAVANNAH ECOLOGICAL ZONES IN GHANA**

BY

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REQUIREMENT FOR THE AWARD OF MA AGRICULTURAL
EXTENSION DEGREE**

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DECLARATION

I solemnly declare that unless for references to other people's work, which have been duly acknowledged, this research work is as a result of an independent study carried out under the supervision of Dr. Jonathan Anaglo of the Department of Agricultural Extension, University of Ghana, Legon and has not been presented anywhere for any other degree.

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Date.....

ABSTRACT

Access to agricultural resources is a major issue in the development discourse. Despite the significant roles both men and women play in agriculture in many developing countries, they continue to have differential access to agricultural resources. This research therefore, studied the relationship between gender and access to agricultural resources in the Sudan and Guinea savannah ecological zones in Ghana. Primary data were gathered using questionnaires administered to a sample of 200 farmers disaggregated into males and females. In order to ensure better representation random sampling was adopted in the study. A district each was selected using randomization from each ecological zone resulting in picking Nadowli and West Gonja Districts as the study area. The study found out that both men and women have more access to labour, improved seeds, fertilizer, insecticides, herbicides, credit, agricultural information through radio, television and Agricultural Extension Agents in the Sudan than in the Guinea savannah zone. Also the men in the 2 zones have more access to family land followed by skin land. However, a wide disparity exists in access to skin land in the Guinea Savannah ecological zone as 28% of males as compared to 3% of females have access to skin land. Also men have more access to labour, improved seeds, fertilizer, insecticides, agricultural information through television and agricultural extension agents. Women on the other hand have more access to herbicides, credit and agricultural information through radio. There was equal accessibility in terms of breeding stocks and low accessibility in access to agricultural information through mobile phone and input suppliers. There is a relationship between gender and access to labour for farming and agricultural information. In addition farmers faced challenges such as high cost of inputs, labour, transportation, land insecurity, mortality, and morbidity of breeding stocks and poor or lack of access to credit. The study recommends that the wide disparity in access to skin land by both sexes should be addressed through land and legal reforms.

DEDICATION

This work is dedicated to all farmers who work tirelessly to ensure sustained food production in Ghana.



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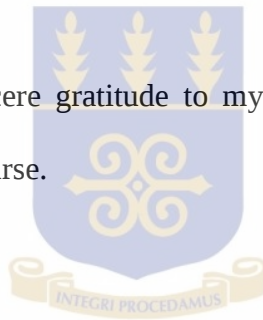


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LIST OF ABBREVIATIONS

AEAs	Agricultural Extension Agents
FAO	Food and Agriculture Organization of the United Nations
IFPRI	International Food Research Policy Institute
MOFA	Ministry of Food and Agriculture
IFAD	International Fund for Agriculture Development
ILO	International Labour Organization
MDGs	Millennium Development Goals

CHAPTER ONE

INTRODUCTION

1.1 Background

In most developing countries agriculture is an important source of livelihood necessary for reducing poverty and food insecurity and can be the engine for growth. In Ghana the contribution of the agriculture sector to the economy of the country continues to be very significant. Agriculture provides employment to large numbers of the population, and foreign exchange, which plays an instrumental role in the development of the country (ISSER, 2009).

The agriculture sector is becoming more technologically sophisticated, commercially oriented and globally integrated which present opportunities and challenges. One of such challenges is gender based inequalities in accessing agricultural resources (World Bank, IFAD, FAO, 2009). There is an increasing recognition that the ownership of, access to and control over agricultural resources constitute critical elements in the determination of the well – being of households and individuals.

Gender equality is crucial for economic and efficiency reasons. This is especially true in the agricultural sector, where gender inequalities in access to and control over resources are persistent. Gender difference, arising from the socially constructed relationship between men and women, affect the distribution of agricultural resources between them and cause many disparities in development outcomes. Also gender roles and relations affect food security and household welfare, critical indicators of human development.

Women and men make crucial contributions in agriculture and rural enterprises in all developing country regions, as farmers, traders, processors, workers or labourers and entrepreneurs. Their roles however, vary across regions but, everywhere, women face gender specific constraints as compared to men that reduce their productivity and limit their contributions to agricultural production, economic growth and the well-being of their families, communities and countries.

There are significant gender inequalities in the ownership and control over agricultural resources. Women control less land than men and the land they control is often of poorer quality and their tenure is insecure (World Bank, FAO, IFAD, 2009). Even though both men and women use working animals in farming, women own fewer of the working animals need in farming as compared to men. They also frequently do not control the income from the typically small animals they manage. Women farmers are less likely than men to use modern inputs such as improved seeds, fertilizers, pest control measures and mechanical tools (World Bank; FAO; IFAD; 2009). They also use less credit and often do not control the credit they obtain. Finally, men and women have less education and less access to extension services, which make it more difficult to gain access to and use some of the other resources, such as land, credit and fertilizer. These factors also prevent women from adopting new technologies as readily as men do (World Bank, FAO, IFAD, 2009).

The World Bank (2005) documented that ignoring gender inequalities comes at great cost to people's well-being and their abilities to reduce poverty. In Sub Saharan Africa the "missed potential" in agriculture is considerable, as evidenced in studies conducted by the World Bank in Burkina Faso, Zambia and Kenya. In Burkina Faso the study established that shifting labour and fertilizer between men's and women's plots could increase output by 10 to 20 percent. In Kenya, the study documented that giving women farmers the same inputs and

education as men could increase yields by more than 20 percent. In Zambia, the study concluded that if women enjoyed the same level of capital investment in agricultural inputs, as their men counterparts, output in Zambia could increase by up to 15 percent.

The potential gains that could be achieved by closing the gender gap in resources are estimated by FAO (2011) in terms of agricultural yields, agricultural production, food security and broader aspects of economic and social welfare. Bringing yields on the land farmed by women up to the levels achieved by men would increase agricultural output in developing countries between 2.5 and 4 percent. Increasing production by this amount could reduce the number of undernourished people in the world in the order of 12–17 percent (FAO, 2011).

According to FAO's latest estimates, 925 million people are currently undernourished. Closing the gender gap in agricultural yields could bring that number down by as much as 100–150 million people. These direct improvements in agricultural output and food security are just one part of the significant gains that could be achieved by ensuring that women have equal access to resources and opportunities. Closing the gender gap in agriculture would put more resources in the hands of women and strengthen their voice within the household – a proven strategy for enhancing the food security, nutrition, education and health of children (FAO, 2011). Also increasing female participation in the labour force has a positive impact on economic growth (Klasen and Lamanna, 2009). Hence the need for "levelling of the playing field".

1.2 Problem Statement

Access to agricultural resources by both men and women is also essential in using agriculture for development. Access to, control over, and ownership of agricultural resources are critical components of well-being. It enables people to create stable and productive lives. Increasing the nexus of control over assets also potentially enables more permanent pathways out of poverty compared to measures that aim to increase incomes or consumption alone (Carter and Barrett, 2006).

For increased agriculture production and productivity, farmers, both men and women, require access to agricultural productive resources such as land for farming, labour for farming, improved seed, fertilizer, insecticides, herbicides and breeding stocks of animals. Farmer capacity to employ improved technology and investment depends on their access to productive resources. Providing better access to agricultural resources is not only necessary to realize their rights, but it contributes to economic growth and poverty reduction (Mason and King 2001).

Both men and women contribute to agricultural production significantly yet their access to these agricultural resources differs (Deere and Doss 2006; Quisumbing et al., 2010; and FAO, 2010). In spite of the contribution of women to agriculture and its related activities, they do not have as much access to and control over agricultural resources as men. For example, women control less land than men and the land they control is often of poorer quality and their tenure is insecure (FAO, 2010). Labour constraints are more acute for female – headed households than men (Dillon and Quiñones, 2010). In some cultural settings in developing countries for example where contact between men and women is restricted and the majority of extension workers are male, women farmers are likely to have less access if not missed by

public extension services. Extension agents tend to approach male farmers more than female farmers because of the general misconception that extension advice will eventually “trickle down” from the male household head to all other household members FAO, (2012). Extension services are often directed towards farmers who are more likely to adopt modern innovations, e.g. farmers with sufficient resources in well-established areas. Women are less likely to access resources and may therefore be by-passed-by extension service providers (Meinzen – Dick et al., 2010).

The evidence for livestock holdings points to systematic gender inequalities. Male headed households have larger livestock holdings, on average, than female-headed households (FAO, 2011). Inequality in the distribution of resources between men and women is linked with production inefficiency, yet interventions targeting smallholder farmers often fail to redress women's lack of access to, and control of, important agricultural resources (Quisumbing et al., 2010).

This “gender gap” hinders their productivity and reduces their contributions to the agriculture sector and to the achievement of broader economic and social development goals. The absence of recognition of the role of women in agriculture constitutes a serious problem. Women play an important role in agriculture, such as marketing, food procurement, household nutrition, weeding, harvesting, preparation of storage containers, poultry raising, and transporting farm inputs to and from the farm field (EEA and EEPRI, 2006), particularly in Africa, but this role often goes unrecognized due to perception bias. The perception of the roles that men and women play in agriculture is biased toward men, and as a consequence, perceptions about the need for rural services are biased toward men as well (World Bank, FAO, and IFAD, 2009). Hence fewer efforts are made to reach women in agriculture and leads to a tremendous loss of opportunity.

Available literature from the situation as it pertains in Ghana is limited to access to land. This situation is key to understanding their subordinate position in society and to explain gender inequality in Ghana. (Awumbila, 1997; Kotey and Tsikata, 1998). Studies cited in Deere and Doss (2006) indicate that women held land in only 10% of Ghanaian households while men held land in 16-23% in Ghana. In many parts of Ghana, pressure on land has resulted in reduction or even abandoning of fallow periods due to land scarcity thus compounding problems of deteriorating soil fertility. Women have been more severely affected by this due to their lower access to land (Awumbila, 1997). Women's lower access to land in the southern forest-savannah transition zone of Ghana, has affected women's ability to practice sustainable environmental management, thus impacting on agricultural and biodiversity on their farms (Ardayfio-Schandorf and Awumbila, 2000). Kotey and Tsikata (1998) suggest that depending on what crops are cultivated on farms and what they are used for, farms can become a male or female domain. For example, in Northern Ghana, the compound farms located around homesteads, have become associated with women's farming, as against commercial tree crop agriculture in Southern Ghana which is largely a male domain. Also of significance are gender inequalities in farm sizes operated by women relative to men. Most women cultivate relatively small farm sizes. It is estimated that in the Upper East Region, women's private average farm sizes was estimated at less than one acre (Awumbila and Momsen, 1995).

There are a number of factors influencing access to agricultural resources of which gender is an important factor to focus on. (Gender and agriculture, 2009). The other factors include age, educational level, status within the household and community, farming systems, social and political capital including group membership, social networks and political representation. (Doss, 2013). Data are needed for researchers to analyze how institutions and structures, such as credit market, labour markets, and especially markets for agricultural

inputs and resources are experienced differently by men and women and how this has an impact on their well-being. This requires information collected at the individual (gender) level on control over and access of agricultural resources. The focus on Guinea and Sudan Ecological Zones is to make ecological comparisons to help identify how men and women have access to agricultural resources as well as to identify similar or diverging constraints in accessing agricultural resources. It is against this background that has necessitated the study.

1.3 Research Questions

The main research questions of the study was;

What is the relationship between gender and access to agricultural resources in the Sudan and Savannah Ecological Zones in Ghana?

The specific questions were:

1. What is the relationship between socio-economic characteristics of farmers and their access to agricultural resources?
2. What is the relationship between gender and access to agricultural resources?
3. What constraints do men and women farmers face in accessing agricultural resources?

1.4 Research Objectives

The main objective of this research is to study the relationship between gender and access to agricultural resources in the Sudan and Guinea Savannah Ecological Zones in Ghana.

The specific objectives were;

1. To examine the relationship between socio-economic characteristics of farmers and their access to agricultural resources
2. To examine the relationship between gender and access to agricultural resources
3. To examine the constraints men and women farmers face in accessing agricultural resources

1.5 Significance of the Study

To bring about agricultural development, access to agricultural resources plays a decisive role. Agricultural development programs are increasingly expected to deliver income, nutrition, food security, and empowerment outcomes as well as agricultural growth, yet relatively little is known about how they affect or are affected by differential access to and control over assets by men and women (Sabates-Wheeler's, 2006). It is important for policy makers to have an understanding of the gendered nature of resource accessibility and how this influences individual and household livelihoods is essential to designing effective development policies and interventions.

Whiles this dissertation aims to contribute to literature on gender and access to agricultural resources, it also seeks to bring the best available empirical evidence to bear on the contributions women make and the constraints they face in agricultural and rural enterprises in the Guinea and Sudan Savannah ecological zones ; to demonstrate how the gender gap limits agricultural productivity, economic development and human well-being; to evaluate critically interventions aimed at reducing the gender gap and to recommend practical steps that national governments and the Ministry of Food and Agriculture in particular can take to promote agricultural development by empowering women.

1.6 Organization of Study

The report consists of five chapters. Chapter One gives an introduction and general background of the study, statement of the problem, objectives of the study, relevance, scope and limitation of the study. Chapter Two contains review of relevant literature on gender and access to agricultural resources. Chapter Three outlines the methodology used to address the objectives of the study and area of study. Chapter Four looks at the data presentation and discussions of findings. Chapter Five concludes the study with the summary, conclusions and recommendations made based on the findings.

1.7 Profile of study areas (West Gonja and Nadowli Districts)

West Gonja District

Damango is the capital of the West Gonja District, the largest of the twenty Districts in the Northern Region of Ghana in terms of land mass. About 30% of the district's land represents forest reserves and Mole National Park. It lies on longitude $1^{\circ} 51'$ and $2^{\circ} 58'$ West and Latitude $8^{\circ} 32'$ and $10^{\circ} 21'$ North. It shares boundaries in the south with Central Gonja District, Bole and Sawla-Tuna-Kalba Districts in the West, Wa East District in the North West, West Mamprusi in the North, Tolon Kumbungu District in the East.

The District has total land area of 8,352 Sq Km. The topography is generally undulating with altitude of between 150 – 200 meters above sea level. The only high land is the Damongo Escarpment, located north of the District capital. Temperatures are generally high with the maximum occurring in the dry season, between March/April and are lowest between December/January. The mean monthly temperature is 27°C . The dry season is characterized by the Harmattan wind, which is dry, dusty and cold in the morning and very hot at noon. Rainfall is bimodal with the average annual precipitation being 1144mm. The rainfall pattern is erratic, beginning in late April to late October. The peak of the rainfall is in June/July with prolonged dry spell in August.

The natural vegetation is Guinea Savanna. The major tree species are sheanut, dawadawa, baobab, acacia, neem and few ebony. The vegetation is suitable for crops such as millet, sorghum, maize and groundnuts. The West Gonja district total population according to the 2010 population and housing census was 84,727. The male population constitute 42,273 and female constitute 42,454.

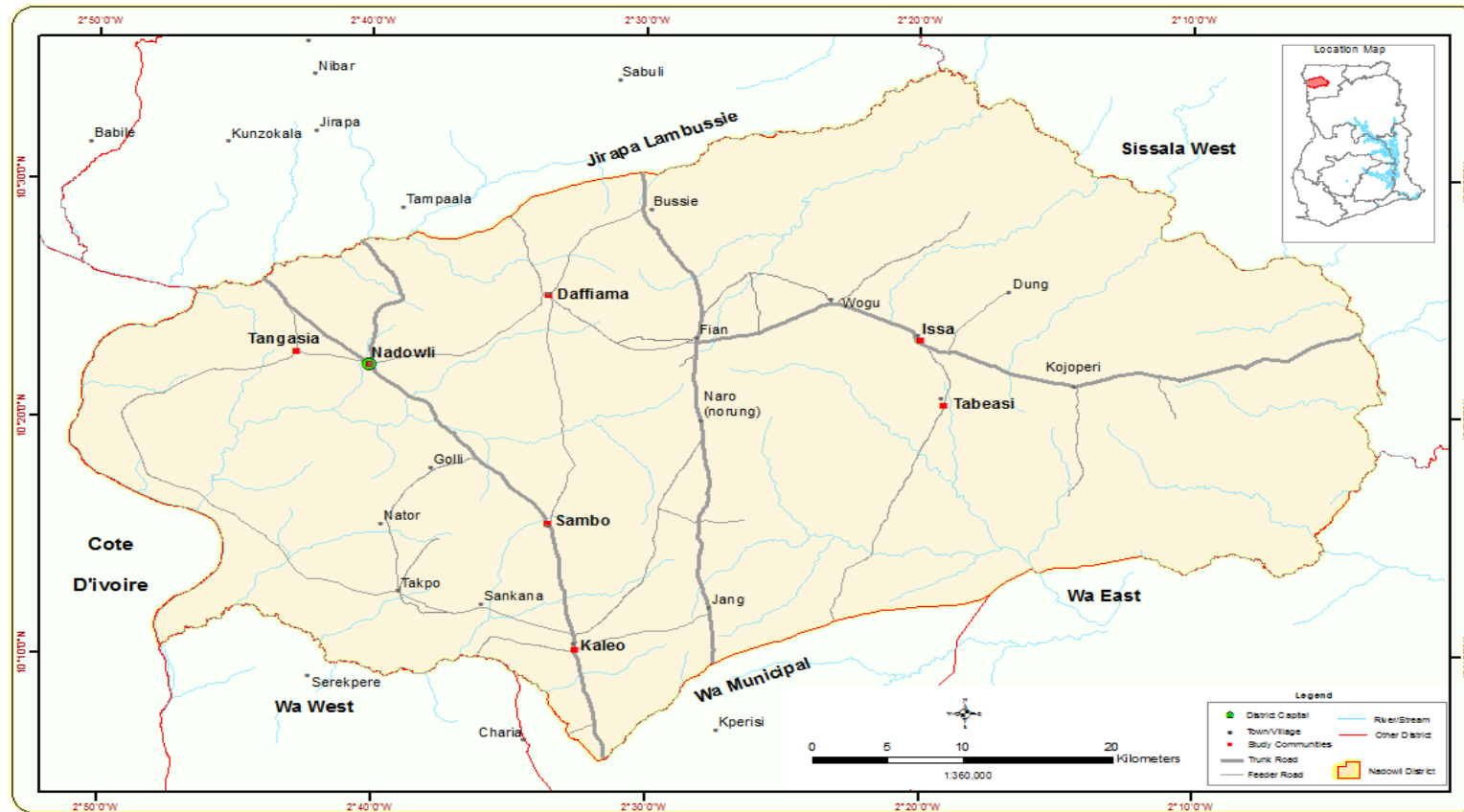
Nadowli District

Nadowli district is located in the heart of the Upper West region of Ghana. It lies between latitude 11° 30' and 10° 20'. The district is low lying but gently undulating at altitudes ranging between 150m- 300m above sea level though some parts average 600m. There is one major stream, the Bakpong and several ephemeral streams, which flow into the Black Volta.

The district has a mean annual temperature of 32 °C and a mean monthly temperature ranging between 36 °C in March to 27 °C in August. The district lies within the tropical continental zone and annual rainfall is confined to 6 months that is from April to September and is also unevenly distributed. Mean annual rainfall is about 1100mm with its peak in August. Between October and March there is virtually no rain and this long dry season is made harsh by the dry northeasterly harmattan winds. Relative humidity is between 70% and 90% during the rainy season but is as low as 20% during the long dry season.

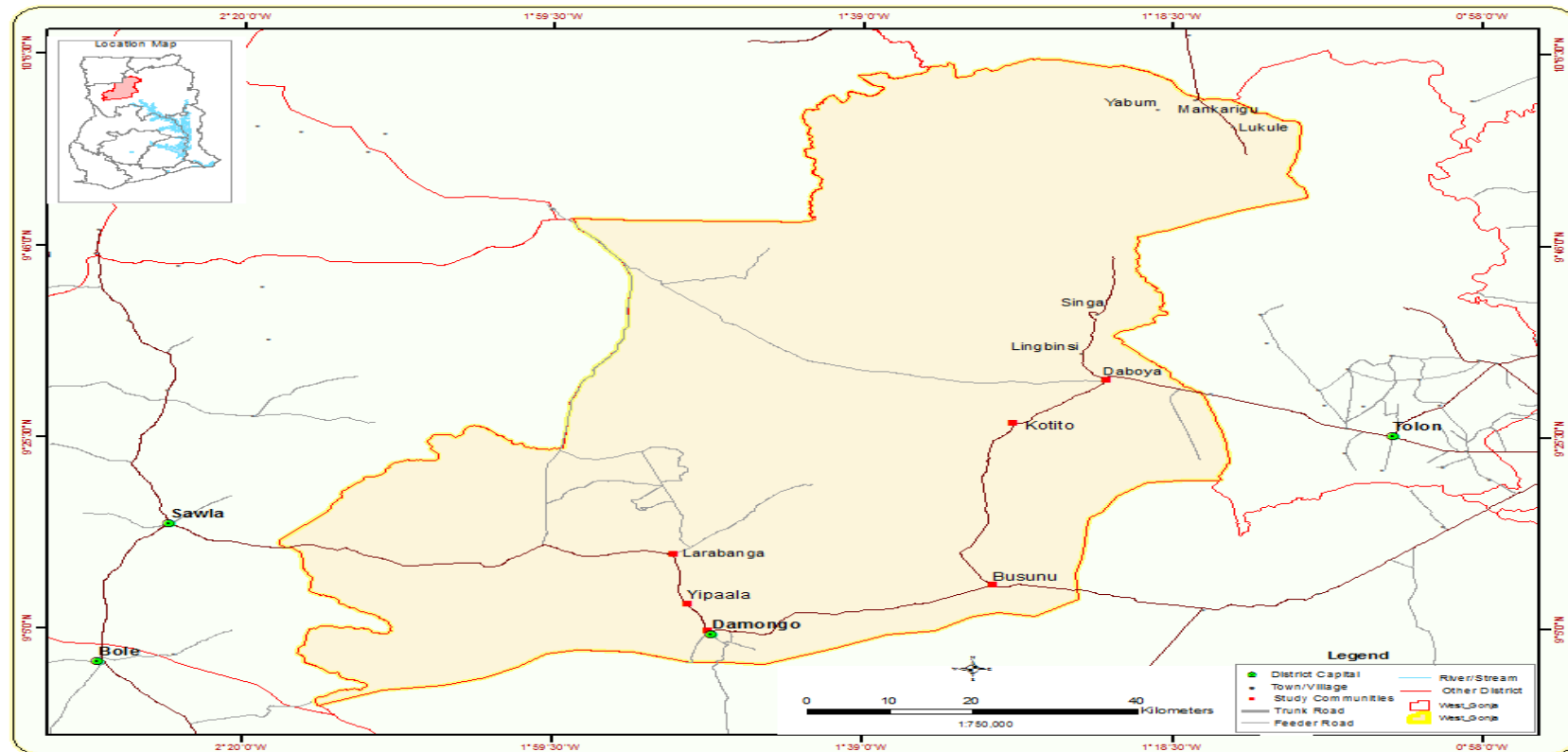
Nadowli district lies within the tropical continental or guinea savannah woodland characterized by shrubs and grassland with scattered medium sized trees. Some economic trees found in the district are kapok, shea, baobab, mango and dawadawa and these are both resistant to both fire and drought. Three main types of rocks underlie the district these are Birimanian and Granite to the west and some parts of the east and basement complex to the east. The Birimanian rock formation is known to have traces of gold, which needs further investigation to establish its feasibility for exploitation. These rocks also hold a considerable quantity of water, which can readily be made available for use by drilling of boreholes and sinking of wells. The soil types are laterite, sandy and sandy loam (savanna ochrosols). Relatively fertile soils (sandy loams) however occur to the south east of the district around Issa and Tabiesi; and support crops such as yams, cereals, legumes and rice.

The Nadowli district total population according to the 2010 population and housing census was 94,388. The male population constitute 44,724 and female constitute 49,664.

Figure 1 Map of Nadowli District

Source: Center for Remote Sensing and Geographic Information System (CERSGIS), 2013

Figure 2: Map of West Gonja



Source: Center for Remote Sensing and Geographic Information System (CESRGIS), 2013

1.8 Limitations to the study

The scope of the study was to examine gender and level of access to agricultural resources. The study concentrated mainly on farmers in the Guinea and Sudan Savannah Ecological Zones. The study was limited to the two zones. Further studies should be conducted to cover the rest of the ecological zones.

1.9 Summary

This chapter gives an introduction and background to the issue under study. It presents the research problem, the research questions as well as the objective guiding the study. It also states the significance of the study, the organization of the study and presents a profile of the study areas (West Gonja and Nadowli Districts). The chapter ends with the limitation of the study.

CHAPTER TWO

CONCEPTUAL FRAMEWORK AND RELATED LITERATURE

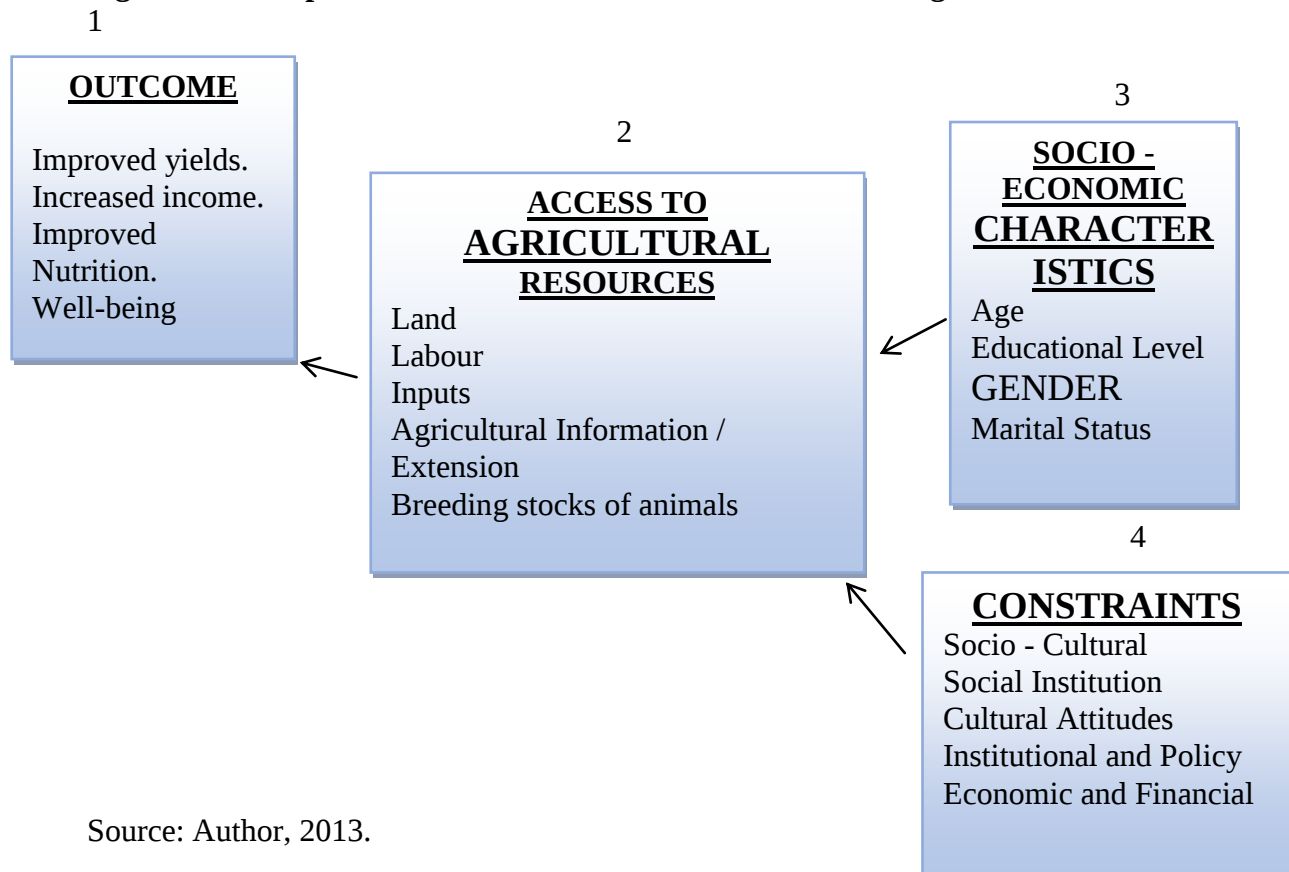
2.0 Introduction

This chapter explains the conceptual framework and reviews some of the available literature on gender and access to agricultural resources.

2.1 Conceptual Framework

The figure 3.0 below describes the conceptual framework showing a possible relationship between socio - economic characteristics of farmers of which gender is a key factor, the constraints faced in accessing and control of agricultural resources which would influence agricultural production.

Figure 3: Conceptual Framework for Gender and Access to Agricultural Resources



Source: Author, 2013.

The conceptual framework explains that access to productive resources play a significant role in enhancing agricultural production, but several socio - economic factors such as gender, age, sex, education, marital status and many others are likely to affect access to and control over this agricultural resources by men and women which could enhance or hamper agricultural production. Access to labour, land, credit, inputs certainly would influence agricultural production (FAO, 2011). Additionally, certain constraints such as financial, social and institutional factors in turn may affect men and women farmers differently and may lead to differences in accessing these agricultural resources (Quisumbing et al., 2008). The study however did not investigate these effect on outcomes such as improved yields, Increased incomes, improved nutrition and well-being.

2.2 Gender Issues in Access and Control of Agricultural Productive Resources

A large body of empirical evidence indicates that there are many disparities in men's and women's access to and control over key agricultural resources. Women usually have less access to land, labour, capital, extension, inputs, and resources for agricultural production (Antonopoulos and Floro, 2005; Deere and Doss, 2006; Deere and Leon, 2003; Peterman, Behrman, and Quisumbing, 2010; FAO, 2010).

2.2.1 Access and Control over Land

Land is the most important household asset for households that depend on agriculture for their livelihoods. Access to land is a basic requirement for farming and control over land is synonymous with wealth, status and power in many areas. Access to land is very much dependent on the land tenure arrangements and system of a particular region.

Gender, together with class, ethnicity, and caste, is one of the most important determinants of land rights in households and rural communities, including land tenure relations. Women and

men have three general mechanisms for obtaining rights to land: (1) through social and kinship relations at the local level, (2) on the land market, or (3) from the state (World Bank, FAO & IFAD, 2009).

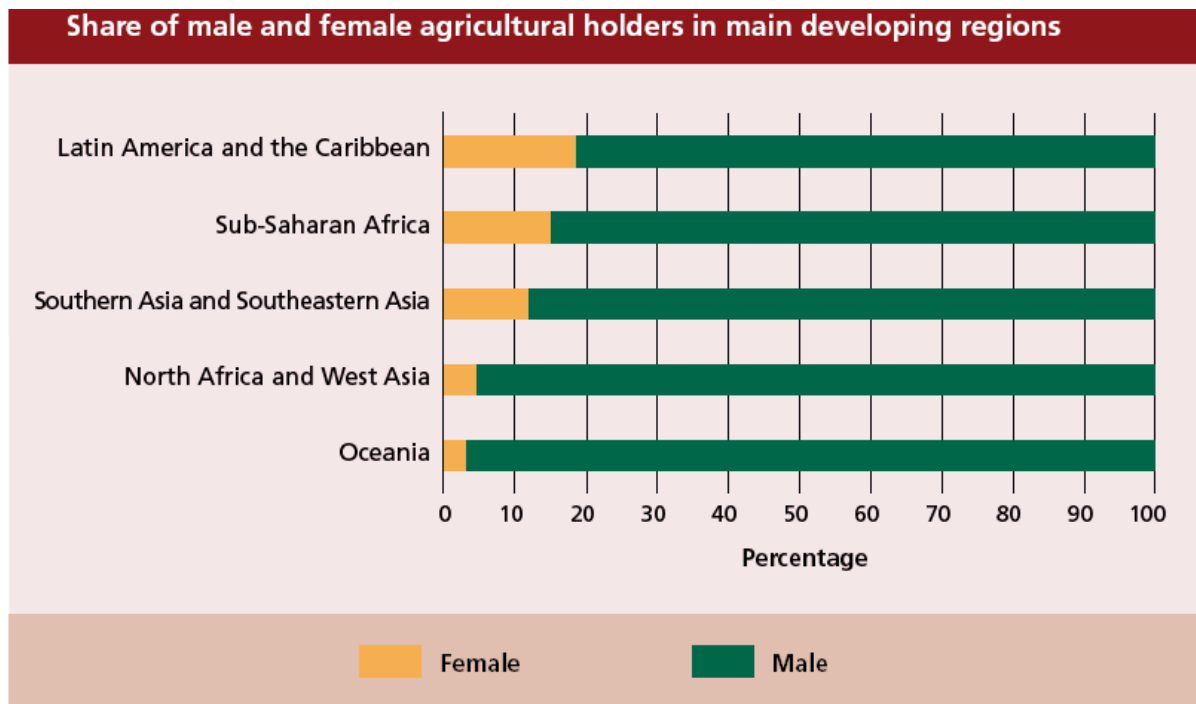
Ghana maintains a plural system of land tenure. The major ways in which women acquire rights in land are through their lineage, through marriage and through contractual arrangements. Women's access to land is affected by tenurial arrangements and inheritance system as well as land use patterns (Awumbila, 1997). In many parts of Ghana, pressure on land has resulted in reduction or even abandoning of fallow periods due to land scarcity, thus compounding problems of deteriorating soil fertility. Women have been more severely affected by this due to their lower access to land (Ardayfio-Schandorf and Awumbila, 2000).

The most comprehensive data on women's access to land come from the FAO Gender and Land Rights Database (FAO, 2010). According to this Database stark gender disparities in land holdings are apparent in all regions. In the figure 4.0 below, women represent fewer than 5 percent of all agricultural holders in the countries in North Africa and West Asia for which data are available. The Sub-Saharan African average of 15 percent masks wide variations. Latin America has the highest regional average share of female agricultural holders. This is confirmed by other findings of studies in Latin America (Deere and León, 2003) and Africa (FAO, 1997).

Also of significance are gender inequalities in farm sizes operated by women relative to men. The literature points to a picture showing that male controlled land holdings are generally larger than female-controlled holdings. Studies cited in Deere and Doss (2006) indicate that women held land in only 10 percent of Ghanaian households while men held land in 16–23% in Ghana. The average size of land holdings in Ghana is small. It is estimated that about 60%

of land holdings is less than 1.5 hectares with women farmers' holdings being half the size cultivated by men (Awumbila and Momsen, 1995).

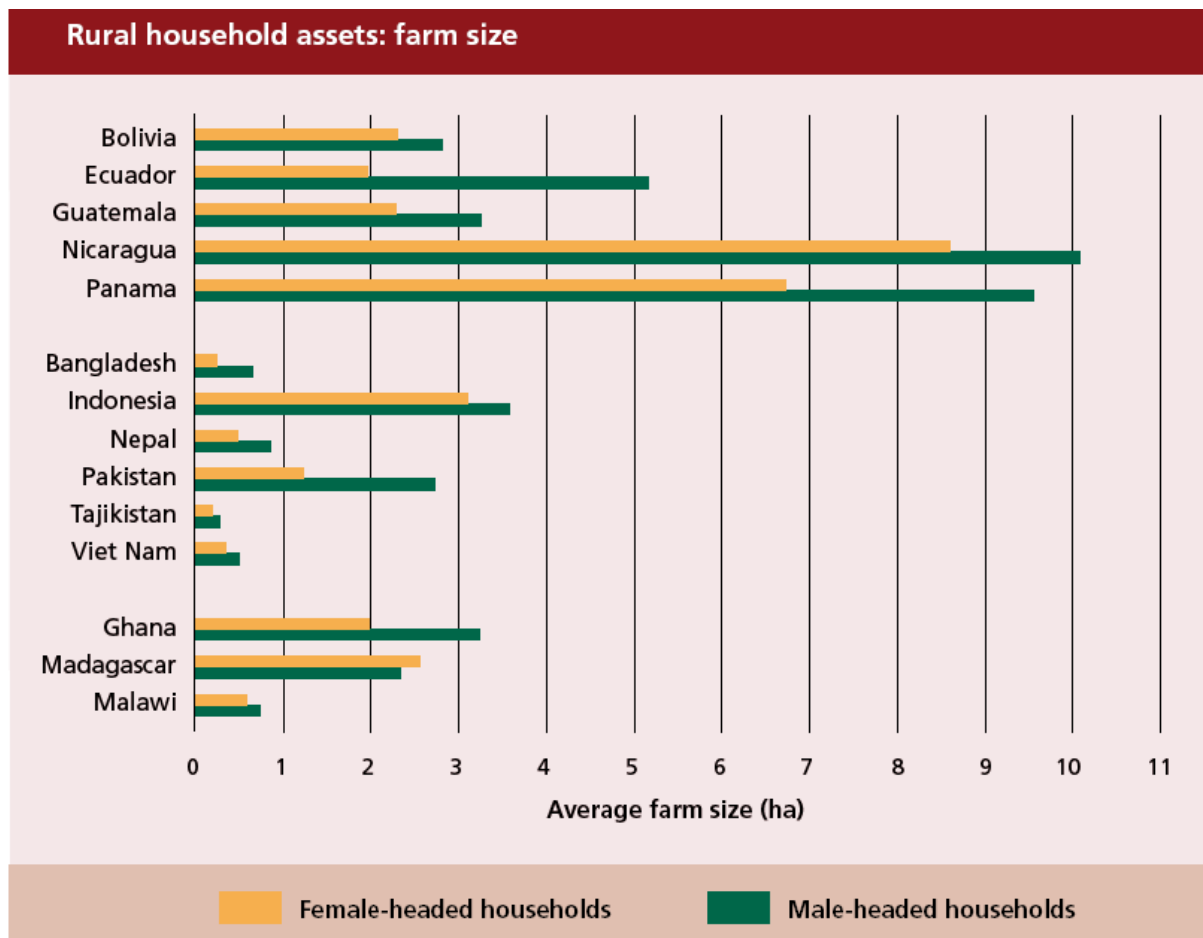
FIGURE 4: Share of land holders in main developing regions.



Source: FAO, 2010

This compromised land access leads women to make suboptimal decisions with regard to crop choices and to obtain lower yields than would otherwise be possible if household resources were allocated efficiently. Insecurity of tenure for women results in lower investment and potential environmental degradation; it compromises future production potential and increases food insecurity.

Representative and comparable data for 20 countries from the RIGA database of household surveys show that male-headed households operate larger agricultural land holdings, on average, than female-headed households in all countries as depicted in the Figure 5.0 below.

Figure 5: Rural household assets: farm size

Source: FAO, 2010 and Anriquez, 2010

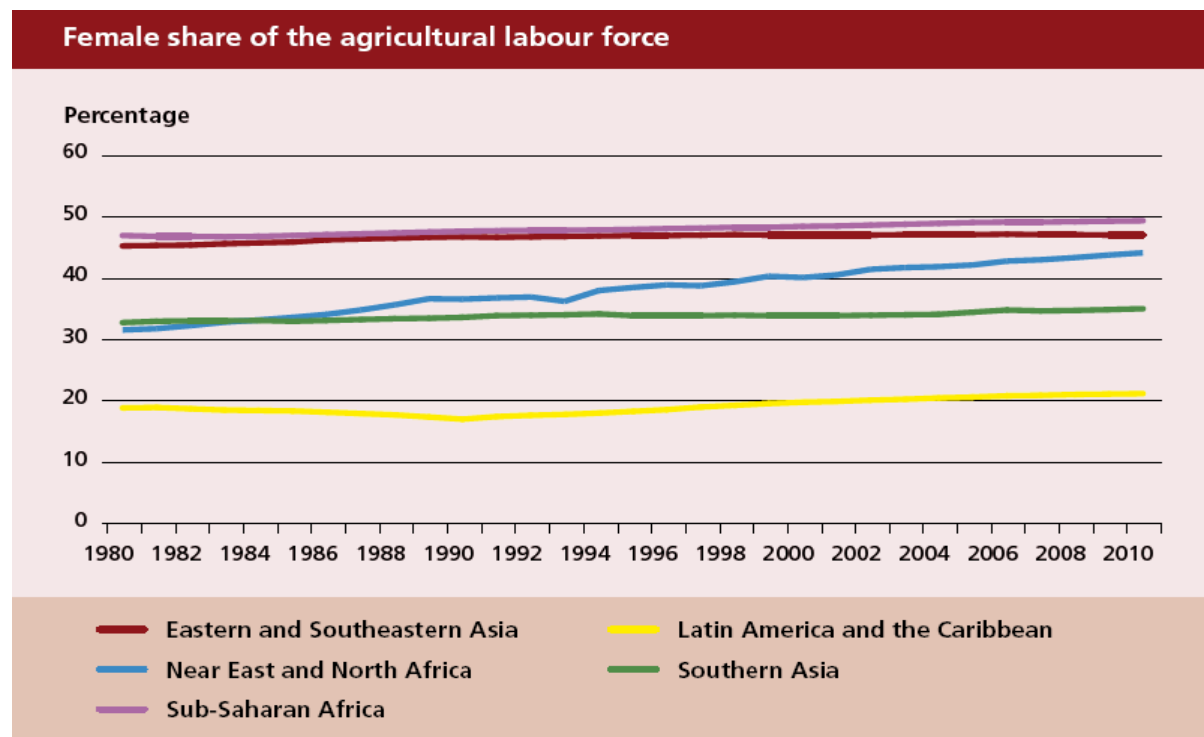
2.2.2 Access and Control over Labour

Labour is a critical input used in farm production. The agricultural labour force includes people who are working or looking for work in formal or informal jobs and in paid or unpaid employment in agriculture. Women work in agriculture as farmers on their own account, as unpaid workers on family farms and as paid or unpaid labourers on other farms and agricultural enterprises.

The 2008 World Development Report identifies key trends in agricultural labour. According to the Report; there is declining agricultural labour. Labour in the agricultural sector is

declining for both men and women, with the exception of women in the Middle East and North Africa. Also more women than men work in agriculture. Data show that when both self-employment and wage labour are considered, women provide more employment in agriculture than men in many regions of the world. Also women's proportion in agricultural wage labour markets has increased, although it still lags behind that of men in all regions.

Figure 6: Female share of the agricultural labour force



Note: The female share of the agricultural labour force is calculated as the total number of women economically active in agriculture divided by the total population economically active in agriculture. Regional averages are weighted by population.

Source: FAO, 2010b.

According to FAO (2012), women comprise an average of 43 percent of the agricultural labour force of developing countries. The female share of the agricultural labour force ranges from about 20 percent in Latin America to almost 50 percent in Eastern and South Eastern Asia and Sub-Saharan Africa as depicted in the Figure 6.0.

Some researchers have raised concerns as to the validity of agricultural labour-force statistics as a measure of women's work in agriculture. Women's participation in the agricultural labour force may be underestimated as the amount of work women do are less likely to be defined by women themselves as work, they are less likely to report themselves as being engaged in agriculture and they work, on average, longer hours than men— so even if fewer women are involved they may contribute more total time to the sector (Deere, 2005).

Labour constraints can be more acute for both women and female-headed households than for men and male-headed households for several reasons. Women generally face gender-specific constraints as agricultural labourers and in hiring-in labour. Low levels of human capital – education, health and nutrition – are a constraint on women's labour productivity in agriculture and other sectors (Behrman, Alderman and Hoddinott, 2004). Often there is a pronounced gender division of labour for particular agricultural tasks, with the result that male and female labour cannot be easily substituted. Moreover, women are time-constrained by domestic tasks such as care- giving and collecting firewood and water (Quisumbing and Pandolfelli, 2010). Female-headed households face more severe labour constraints than male-headed households because they typically have fewer members but more dependants. In some areas, male out-migration adds to the constraint already imposed by gender-specific farming tasks. Female-headed households may receive help from male relatives, but only after the men have taken care of their own plots.

These gendered labour constraints may require policy interventions beyond those aimed at promoting economic growth and the efficiency of rural labour markets. Policies can influence the economic incentives and social norms that determine whether women work, the types of work they perform and whether it is considered an economic activity, the stock of human

capital they accumulate and the levels of pay they receive. Increasing female participation in the labour force has a positive impact on economic growth (Klasen and Lamanna, 2009).

2.2.3 Access and Control over Extension Services

Over the past years, Agricultural extension services has made many arrangements tailored and reinvented to meet the needs of diverse groups of farmers, to explore market opportunities and funding constraints. Extension services encompass the wide range of services provided by experts in the areas of agriculture, agribusiness, health and others and are designed to improve productivity and the overall well-being of rural populations.

Despite the involvement of women and women's groups in Agricultural Extension Trainings and programmes, under investment in the knowledge and skills of women remains a challenge confronting agriculture especially in developing countries. Within Agricultural Extension Training Institutions, women remain under represented as students, instructors, extension agents, and researchers (FAO, 2004).

According to a 1988–89 FAO survey of extension organizations covering 97 countries with sex-disaggregated data only 5 percent of all extension resources were directed at women. Moreover, only 15 percent of the extension personnel were female (FAO, 1993). Despite the evidence that the provision of agricultural extension can lead to significant yield increases extension provision in developing economies remains low for both women and men, and women tend to make less use than men of extension services (Meinzen-Dick et al., 2010).

The preference for female extension agents varies by country and marital status. In Ghana, for example, male and female farmers in male-headed households have equal contact with extension agents but female farmers in female-headed households have much less contact, although they are willing to speak to agents of either sex (Doss and Morris, 2001). In

Tanzania, on the other hand, many female farmers prefer to talk to a female extension officer and, by 1997, one-third of extension officers were women, up from almost none 15 years prior (Due, Magayane and Temu, 1997). In Kenya, contact with the extension agent contributed significantly and positively to output on male-managed plots, but not necessarily on female-managed plots (Saito, Mekonnen and Spurling, 1994).

The Food and Agricultural Organization (FAO) survey identified some constraints which limit women's access to extension services. These are as follows: cultural restrictions which prevent male extension officers from meeting women farmers. Domestic responsibilities sometimes limit women's mobility, making it harder for them to attend meetings and trainings away from home. There are very few women agricultural extension agents who interact with fellow women farmers also, their inability to speak the formal language, through which extension services are offered.

Extension service agents tend to approach male farmers more often than female farmers because of the general misperception that extension advice will eventually “trickle down” from the male household head to all other household members. Extension services are often directed towards farmers who are more likely to adopt modern innovations, for example farmers with sufficient resources in well- established areas. As discussed above, women are less likely to access resources and may therefore be by passed by extension service providers (Meinzen-Dick et al., 2010). Finally, the way in which extension services are delivered can constrain women farmers in receiving information on innovations. Women tend to have lower levels of education than men, which may limit their active participation in training that uses a lot of written material. Time constraints and cultural reservations may hinder women from participating in extension activities, such as field days, outside their village or within mixed groups (Meinzen-Dick et al. 2010).

Several participatory extension approaches have been developed in an effort to move away from a top-down model of extension service provision to more farmer-driven services. These approaches can target women effectively and increase their uptake of innovations (Davis et al., 2009). However, little evaluation has been done on these gender sensitive participatory approaches (Quisumbing et al., 2008).

Modern information and communication technologies (ICTs) such as radio, mobile phones, computers and Internet services can also play an important role in transferring information. ICTs offer opportunities for accessing and sharing information faster, networking, the mobilization of resources and educational purposes. Rural women may face barriers in accessing ICTs because of their limited education and financial and time constraints. Locations that are convenient and appropriate for women to visit can help improve women's access (Best and Maier, 2007).

2.2.4 Access and Control over Credit

Financial services such as savings, credit and insurance play a critical role in providing opportunities for improving agricultural output, food security and economic conditions at the household, community and national levels. Without access to credit, producers may be unable to bear the risks and up-front costs associated with the innovations and investment necessary to enhance their productivity, income and well-being. It has been argued that "Access" to credit and other financial services means more than just physical proximity; it means removing direct and indirect gender discrimination in the design, promotion, and delivery of all financial services.

Evidence shows that credit markets are not gender-neutral. The gender gap in access to credit is confirmed by many authors. In Ghana, for example, about 44% of the credit portfolios of

Rural Banks in Ghana go to women and the remaining 56% goes to men (Akudugu et al., 2009). Education, application procedures, access to land, income level, farm size, membership to economic association, savings, type of crops grown, interest rate and distance to rural banks are the socio-economic, technical and institutional factors that influence women farmers' access to credit (Akudugu et al., 2009). In Madagascar, the share of female-headed households that use credit is 9 percentage points smaller than the share of male-headed households who do so (FAO, 2011). Also in Uganda, nearly all female-headed households reported a desire to expand agricultural activities but lacked the money to purchase land and inputs such as seeds, fertilizer and pesticides, and/or to hire-in labour. They cited the lack of access to credit as one of the most prominent barriers to livelihood diversification (Ellis, Manuel and Blackden, 2006).

There are contextual disadvantages that women face in accessing credit and these are compounded by institutionalized discrimination (Anderson-Saito, Dhar, and Pehu, 2004). Institutions refer to customs and behaviour patterns that are important to society, as well as to particular formal organization of government and public service (World Bank, 2008). Institutional discrimination by private and public lending institutions often either ration women out of the market or grant women loans that are smaller than those granted to men for similar activities. Moreover institutional bias towards providing services to the head of the household owning title deeds (assumed to be a man), discriminates against women (Fletschner, 2009; World Bank, FAO and IFAD, 2009).

In the developing world, banks and credit association are less inclined to lend to women because without property and land rights, they lack collateral. Women generally have less control over the types of fixed assets that are usually necessary as collateral for loans. High transactions costs and the nature of women's business, often concentrated in narrow range of

activities with insufficient resources for investment results in low returns and therefore limit women's ability to obtain credit. Their unsecure land tenure and lower levels of education and literacy rates have contributed to their ineligibility to formal credits even though women are noted to be more credit worthy than men (Duncan, 2004).

Cultural norms and social customs possess restrictions on women's mobility in household and community responsibility for household subsistence present real impediments to accessing rural financial services (World Bank, 2008). Also social customs in some cultures also prohibit women from receiving information from outside lenders which is important in circumstances where information is not fully transmitted from husbands to wives (Quisumbing et al., 2008).

Targeting women may therefore improve the financial sustainability of rural finance institutions. This benefit is in addition to the efficiency benefits to the rural economy of enabling over half the rural population to save and gain access to loans, insurance, and other services so that they can contribute to rural economic growth (World Bank, 2007). Evidence indicates that access to microfinance can initiate the virtuous spirals of economic empowerment, increased well-being, and social and political empowerment of women themselves (Cheston and Kuhn, 2002). Women—in some contexts, many women—show enormous resourcefulness and initiative when provided with a loan or the opportunity to save without interference from family members (Barrientos et al., 2001).

Despite the considerable potential of rural financial services for women, there is still a long way to go before women have equal access to these services or fully benefit from them. Achieving both of these goals does not depend only on expanding financial services per se, but also on the specific types of financial services that are delivered in different contexts to

women from different backgrounds and by different types of institutions or programs (Mayoux and Harti, 2009).

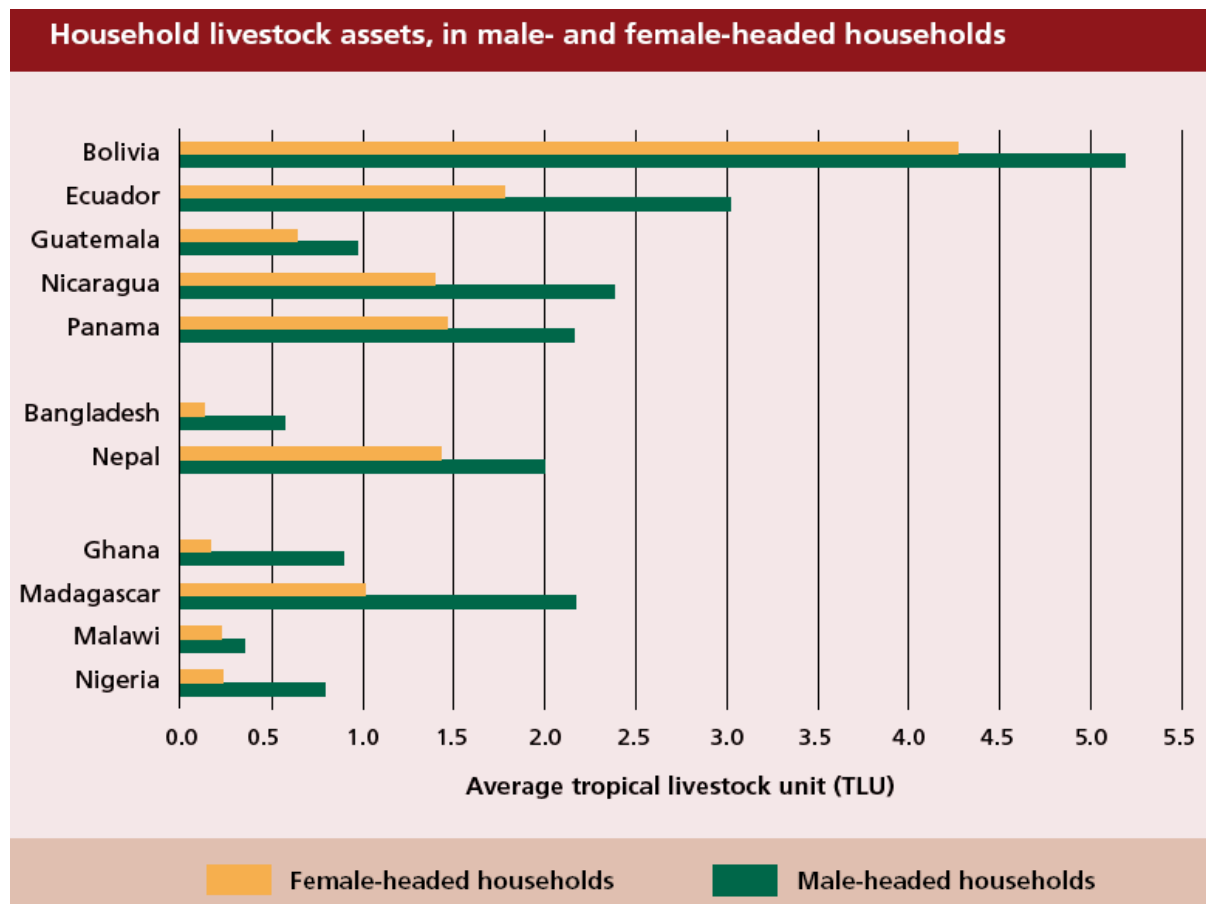
2.2.5 Access and Control over Breeding Stocks

Livestock is another key resource and asset in rural areas (FAO, 2009). Livestock plays an important role in supporting men and women in providing incomes, employment creation and improved food security across different production systems. However, a number of challenges face the livestock sector, including ensuring food, resource, and livelihood security for poor smallholder producers and processors. The challenges demand innovative and sustainable approaches, particularly given that more than 200 million smallholder farmers in Asia, Africa, and Latin America rely on livestock as the main source of income (FAO, 2009). Applying a “gender lens” to identify and address women’s and men’s different needs and constraints related to relevant livestock production systems and value chains is important for determining the most optimal outcomes as well as the most effective use of resources. Women are almost universally recognized for their role as the main actors in managing poultry, small ruminant, and micro livestock production (Guèye, 2000; Tung, 2005) as well as dairying, including the processing and marketing of milk and milk products (Tangka, Jabbar and Shapiro, 2000).

As was the case for access to land, the evidence for livestock holdings points to systematic gender inequalities. Male-headed households have larger livestock holdings, on average, than female-headed households as depicted in Figure 7 below. Inequality in livestock holdings appears to be particularly acute in Bangladesh, Ghana and Nigeria, where male holdings are more than three times larger than those of female-headed households. This is confirmed by other studies that evaluate the value of livestock holdings. Data from northern

Nigeria, for example, indicate that the value of men's livestock holdings is about twice that of women's (Dillon and Quiñones, 2010).

Figure 7. Household Livestock Assets, in male- and female-headed households



Source: FAO, 2010.

Men's and women's reasons for keeping livestock may differ as shown in a study conducted in Bolivia, India, and Kenya. In Kenya women thought of livestock as primarily contributing to food security, whereas men saw livestock as a way to meet needs such as school fees, food, and a way to invest. (Heffernan, Nielsen and Misturelli, 2001). Also a study conducted by Dillon and Quiñones (2010), found that men and women use livestock differently as a store of wealth and as a buffer against shocks. Men are more likely to hold assets in the form of large animals such as cows and bulls while women are more likely to hold assets in the form

of small animals, household durable goods and jewellery. Women tend to draw down assets more quickly than men in response to crises and as they get older. Further, women may or may not control, or be part of, household decision-making processes, especially in relation to the sale of animals and animal products. In the agro pastoral systems of Iringa, Mara, and Mwanza in Tanzania, women could not sell or slaughter their animals without consulting their husbands, but they could decide to use their money from the sale of surplus food crops to buy livestock. They could also sell or exchange their poultry without seeking their husband's permission. In the intensive systems of Kilimanjaro, milk, which was once under women's control, came under women's and men's control as it became a key source of household income (Hill, 2003). As keepers of breeds, women and men contribute to the enhancement of gene flow and domestic animal diversity depending on their roles and responsibilities in animal husbandry (FAO, 2002).

2.2.6 Access and Control over Agricultural Inputs

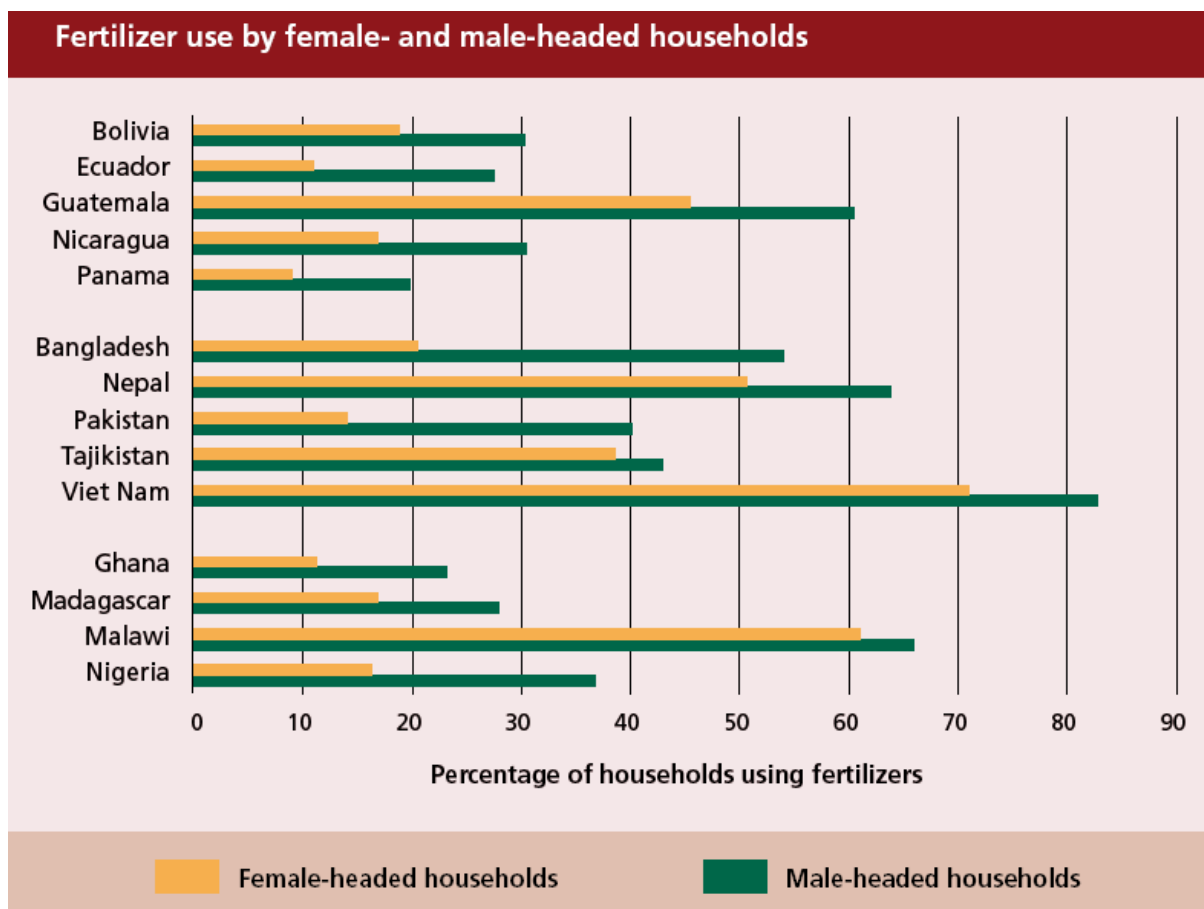
Access to agricultural input such as new technology, improved seeds, fertilizer, insecticides and herbicides are crucial in maintaining and improving agricultural productivity. Gender gaps exist for a wide range of agricultural technologies, including machines and tools, improved plant varieties and animal breeds, fertilizers, pest control measures and management techniques (FAO, 2011).

A number of constraints, including gender gaps lead to gender inequalities in access to and adoption of new technologies, as well as in the use of purchased inputs and existing technologies. The use of purchased inputs depends on the availability and accessibility of complementary assets such as land, credit, education and labour, all of which tend to be more constrained for female-headed households than for male-headed households (World Bank, FAO and IFAD, 2009).

The adoption of improved technologies is positively correlated with education but is also dependent on time constraints (Blackden et al., 2006). In an activity with long turn around periods, such as agriculture, working capital is required for purchasing inputs such as fertilizers and improved seeds; however, women face more obstacles relative to men in their access to credit. Adoption of improved technologies and inputs may also be constrained by women's lower ability to absorb risk. The evidence points to significant gender differences in the adoption of improved technologies and the use of purchased inputs across regions (Peterman, Quisumbing and Behrman, 2010). For example, male-headed households show much wider use of fertilizers than their female counterparts in many countries as depicted in figure 8 below

In Ghana, for example, Doss and Morris (2001) found that only 39% of female farmers adopted improved crop varieties (compared with 59% of male farmers) because they had less access to land, family labour and extension services. Several studies from Kenya show that female-headed households have much lower adoption rates for improved seeds and fertilizers. These differences are explained by reduced access to land and labour, lower education levels and limited access to credit markets (Ouma, De Groote and Owur, 2006). Credit constraints also limit the access of female-headed households to fertilizers in Benin and Malawi (Minot, Kherallah and Berry, 2000).

The gender difference in the access and use of farm equipment may have further implications (Quisumbing, 1995). The author concludes that farmers with more land and tools are more likely to adopt other technologies, thus highlighting the complementarities among agricultural inputs. Furthermore, lack of access to transportation technology often limits the mobility of women and their capacity to transport crops to market centres.

Figure 8: Fertilizer Use by Female and Male Headed Households

Source: FAO, 2010.

It is important to note that not all types of female-headed households are equally constrained in their access to technology. Animal traction is in common use in the Northern Ghana but predominantly by male farmers due to cultural beliefs which place ownership and management of cattle and livestock in men (Duncan, 2004).

2.3 Access to Agricultural Resources and Socio-Economic Characteristics

Socio-economic characteristics are among the most common household characteristics which are associated with farmer's access to agricultural resources. Access to agricultural resources are influenced by socio-economic characteristics such as age, educational level, marital status

and gender of farmers. These variables were reviewed in this study but there is a limitation of empirical study on these variables.

With regards to age, different studies report different results. Haba (2004), he assessed that the willingness to pay for agricultural information delivery technologies such as print, radio, farmer-to-farmer, expert visit, and television. He revealed that, as age increased, the willingness to pay for these agricultural information delivery technologies decreased, meaning that older farmers were less willing to get information than younger ones. On the other hand, study conducted by Katungi (2006), on social capital and information exchange in rural Uganda reveal that older men are less likely to engage in simultaneous receiving and providing of information, perhaps due to the low ability to communicate associated with old age. All this points assure that, as age increase the getting of agricultural information also decrease.

The Ghana Household Survey (2010) revealed that one's marital status had a significant impact on access and control over agricultural land. This is also confirmed by Duncan (2001) also revealed that one's marital status had a significant impact on access to and control over land. Apart from land, credit and one's marital status has also been extensively covered in literature. Okunade (2007) in a study revealed that marital status had no relationship with access to credit. On the other hand, a study conducted by Odoh et al., (2009) found that marital status and access to credit are statistically significant at 5% and 10% as having strong effect on the amount of loan obtained by the smallholder cassava farmers. They equally observed that most farmers accessed credit through informal means such as cooperatives, susu etc. Again, male farmers have been noted to have higher access to credit than female farmers due to their ability to present collateral. Furthermore, the study revealed that lack of collateral, high interest rate, delay in accessing credit and inability of farmers to get sureties

for the loan are the most important constraining factors in accessing credit by the smallholder cassava farmers.

Educational level of farmers also influence access to agricultural resources. A study by Adewale and Ogunniyi (2000) found that formal education of farmers have no significant relationship with their access to credit. However, a study by FAO (2001) attributed such a situation to complex and intimidating administrative procedures which hold back farmers with low levels of education. There is a general agreement that education is associated with receiving, absorbing, agricultural information and utilization of information. Because education is believed to increase farmers' ability to obtain, process and analyze information disseminated by different sources and helps him to make appropriate decision to utilize agricultural information through reading and analyzing in a better way.

2.4 Access to Agricultural Resources and Socio-Cultural, Institutional and Policy Constraints

The constraints affecting access to agricultural resources include; women's legal and cultural status, which affects the degree of control women have over productive resources and the benefits which flow from them as well as property rights and inheritance laws, which govern access to and use of land and other natural resources.(Kotey and Tsikata, 1998). In Ghana, laws and norms and practices define the parameters for example, the inheritance and marital regimes. In the case of land tenure, for example, Minkah-Premoh and Dowuona-Hammond (2005) observe that the plural legal system presents difficulties, particularly to women. Customary law does not confer on the woman rights to her husband's property and a widow or divorcee cannot stake a claim to her husband's property (Dowuona-Hammond 1998). Customary law and practices are biased against women's acquisition of assets through inheritance and marriage. The issue of land tenure is genderised with women having less

access to land and other productive resources. Studies cited in Deere and Doss (2006) indicate that women held land in only 10% of Ghanaian households while men held land in 16-23% in Ghana. In many parts of Ghana, pressure on land has resulted in reduction or even abandoning of fallow periods due to land scarcity thus compounding problems of deteriorating soil fertility. Women have been more severely affected by this due to their lower access to land (Awumbila, 1997). Kotey and Tsikata (1998) suggest that depending on what crops are cultivated on farms and what they are used for, farms can become a male or female domain. For example, in Northern Ghana, the compound farms located around homesteads, have become associated with women's farming, as against commercial tree crop agriculture in Southern Ghana which is largely a male domain. Also of significance are gender inequalities in farm sizes operated by women relative to men. Most women cultivate relatively small farm sizes. It is estimated that in the Upper East Region, women's private average farm sizes was estimated at less than one acre (Awumbila and Momsen, 1995). Kotey and Tsikata (1998) suggest that depending on what crops are cultivated on farms and what they are used for, farms can become a male or female domain. For example, in Northern Ghana, the compound farms located around homesteads, have become associated with women's farming, as against commercial tree crop agriculture in Southern Ghana which is largely a male domain. Also of significance are gender inequalities in farm sizes operated by women relative to men. Most women cultivate relatively small farm sizes. It is estimated that in the Upper East Region, women's private average farm sizes was estimated at less than one acre (Awumbila and Momsen, 1995).

The other constraining factors include the relationship between economic factors such as market forces and gender determined responsibilities such as domestic household activities, feeding the family, which trade off basic household self-provisioning goals and care of the family against production for the market (Awumbila, 1997). This ultimately results in low

economic or purchasing power which may not only be used to buy food and other basic assets for themselves and their families, but also to pay for the agricultural inputs used in food production.

Another constraining factor is the way that agricultural institutions and policy are designed, staffed and managed. The bias is illustrated in fewer women representation and involvement in farmer trainings. Also male dominated extension staff assumptions about women's roles in farming have excluded women's involvement. Consequently women have little access to the benefits of research and innovation. Again women have limited access to education; training and extension services as most training and extension services tend to focus a lot more on cash crops. Attempts to address these concerns have included gender sensitization training to initiate the task of attitude change within male-dominated extension and research bureaucracies and other donor agencies. Training materials and methods for gender analysis in agriculture have also been developed. Participatory action learning also has proved to be a powerful approach to institutional change (World Bank, 2007).

2.5 Summary

This chapter has described the various components of the conceptual framework. It outlined the basic concepts regarding socio economic characteristics of which gender is an important factor to consider in access and control of agricultural resources and the constraints inhibiting access to and control of the use of agricultural resources. The literature further reveals that access to resources is influenced by socio cultural, institutional and economic factors, reflecting gender inequalities in access to resources and development.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter gives details of the methods used and materials employed to achieve the objectives of the study. It discusses and analyses the entire research design which includes the sampling technique; sample size of the study; the nature and source of data, and the way these data were collected and analyzed.

3.1 Research design

The research design used for the study was a survey. A survey research is a descriptive research in which survey instruments mostly the questionnaire and interview guides are used to collect data to describe the population (Cresswell, 2006). Surveys are usually quantitative. Survey design was chosen because of its numerous advantages such as providing important insights into the gender disaggregation of respondents, collection of a wide scope of information from large population.

3.2 Population of study

Cresswell (2006) explains a target population as the unit for which information is required. The target population of the study was all farmers in the West Gonja and Nadowli Districts.

3.3 Units of analysis

According to Neuman, (2007), the unit of analysis is the kind of empirical case or unit that a researcher observes, measures and analyzes in a study. It can be an individual/unit, group or

mass. The unit of analysis as far as this study is concerned is the male and female farmers in Nadowli and West Gonja Districts.

3.4 Sampling

A district each was selected from each ecological zone. The selection was done using randomization. The names of districts were put into a basket and one each picked. The draw resulted in picking Nadowli and West Gonja as the study areas. In selecting the villages from the Districts, five villages each were selected from the two districts. The selection was done through random sampling. The names of the villages were put into a basket and five of them selected randomly. The Table 1.0 below shows the names of the villages selected from the two (2) districts.

Table 1: Communities of the Study Area

District	Communities
WEST GONJA	Busunu, Kotito, Larabaga, Nabora, Yipaala
NADOWLI	Daffiama, Dakyea, Issa, Kaleo, Sombo,

In selecting the farmers, 20 farmers were selected from each village using random sampling. The total number of farmers selected per district is 100 ($100 \times 2 = 200$). This was made up of 100 women and 100 men because the study seeks to disaggregate the results by gender.

The sampling frame was a list of farmers obtained from the farmer registration list made available by the District Agricultural Extension Officer. The respondents (farmers) from each of the districts were then selected using the simple random sampling. To satisfy the condition of randomness, a table of random numbers was used in the sample selection to ensure that each farmer had an equal chance of being selected. With the help of the Agricultural

Extension Agents, the farmers were identified and interviewed using a structured questionnaire.

3.5 Development of data collection instruments

The objectives of the study were achieved through the use of both primary and secondary data. Secondary data were collected from available literature sources at the Ministry of Food and Agriculture (MOFA) and the District Directorates of Agriculture. Also secondary data were sourced via the internet on related works, and other documented reports from the Food and Agriculture Organization (FAO), World Bank, International Food Policy Research Institute (IFPRI) and International Fund for Agricultural development (IFAD).

Primary data were collected from the survey using structured questionnaire and semi-structured interview guide. Reconnaissance visits were carried out in some communities to help shape impressions of the area and guide the design of the data collection instruments. The structure of the questionnaire followed the objectives of the study.

The questionnaire included a background or socio economic characteristics, sections on farming activities, access, control and decision making on resources and access to resources and extension. The interview guide for professionals captured issues which centered on the extent to which gender is incorporated into programmes and activities undertaken by their organizations. All interviews were tape-recorded and later transcribed. It should be noted that, tape-recordings were done based on the consent of interviewees. Data collected were both quantitative and qualitative

3.6 Pre-testing of data collection instruments

Pretesting entails trying the questionnaire out in similar interviewers and respondents to those to be used in the main study. According to Cresswell (2006), pretesting offers opportunity of

determining whether the interview questionnaire meet expected standards of clarity, adequacy and lay out for easy administration. Furthermore, pretesting helps the researcher assess whether the interviewers do understand and can administer the instrument effectively and efficiently and whether the target respondents find the interview schedule adequate for its purpose (Cresswell, 2006; Barbie, 2004). In the light of the above, the first draft of both the questionnaire and the interview guide were pre-tested using 10 farmers. This helped to satisfy the conditions of validity of the questionnaire.

3.7 Data collection

A combination of methods was used to collect data. Whilst the secondary data on the issue were gathered from the web sites of various institutions of relations to gender and access to agricultural resources and other documented reports, the primary data gathering instruments for the primary data were structured questionnaires. Appendices 1 present the structured questionnaire for the farmers

3.8 Data analysis

The study generated a rich mix of nominal and ordinal categorical data as well as open-ended responses. The open-ended responses of the questionnaire and the interviewees were subjected to detailed thematic analysis. The Statistical Package for Social Sciences (SPSS) version 18 was the main statistical software used for the generation of summary statistics such as percentages showing the background or socio-economic characteristics of the respondents. Relevant variables such as access and source of land for farming, labour for farming, improved seeds, fertilizer, insecticides, herbicides and breeding stocks were cross tabulated with gender for bivariate analysis and chi square test for clarity of explanations of the responses.

Chi-square (χ^2) test is used when one wishes to explore the relationships between two categorical variables. It informs the researcher whether the collected data are close to the value considered to be typical and generally expected and whether two variables are related to each other (Cresswell, 2006). The findings were also presented in percentages, frequency distributions and graphs. The analyzed data was then interpreted.

3.9 Summary

Chapter three looks at the approaches and tools that were employed to achieve the objectives of the study. The survey design was employed and 200 respondents were selected from 10 randomly selected communities in the Sudan and Guinea savannah ecological zones.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents findings from the field. The data has been arranged to respond to the objectives of the study. To recapitulate, the main objective of the study is to study the relationship between gender and access to agricultural resources in the Sudan and Savannah Ecological Zones in Ghana.

The specific objectives of the study are;

1. To examine the relationship between socio-economic characteristics of farmers and their access to agricultural resources
2. To examine the relationship between gender and access to agricultural resources
3. To examine the constraints men and women farmers face in accessing agricultural resources

4.2 Socio–Demographic Characteristics of Respondents

This chapter begins with a discussion on the socio–demographic characteristics of the respondents. This is very important because the social environment of a people ultimately influence and shape their perception.

Age of Respondents

The ages of respondents are depicted in Table 2 below. It ranges from <25 to >60 years with a mean age of 25. Age determines the availability of able–bodied people for agricultural production, ease of use of innovations and level of risk aversion, all of which have been found to affect the rate of agricultural production. A large proportion (67%) of respondents falls within the age range of 25-45years in both Sudan and Guinea Savannah Ecological Zones. The age range can be regarded as youthful age when farmers can make vital impact in

agricultural production and development in general. This has positive consequences on the agriculture sector in the two ecological zones because most of the farming activities will have to be carried out by middle aged. It is therefore not surprising that one of the policies of the Ministry of Food and Agriculture is to encourage more youth to go into agriculture in its Youth and Agriculture Programme. Only 31% of the respondents fall within the age category of 46–60 categorized as old. However, only 1.5% of the respondents are above 60 years.

Table 2: Age of Respondents by ecological zone

Age	Sudan		Guinea	
	Male	Female	Male	Female
>60 (Elderly)	0	2	2	2
46-60 (Old)	18	26	48	32
25-45 (Middle age)	82	70	50	66
<25 (Young)	0	2	0	0
Total	100	100	100	100

Source: Survey Data, 2013.

4.2.2 Number of Children of Respondents

In the study, majority of respondents (38.5%) had between 4 to 7 children followed by 36% and 25.5% of respondents having less than 4 and greater than 7 children respectively. This was to be expected as the fertility and birth rate of the two ecological zones is relatively high as compared to the national rate.

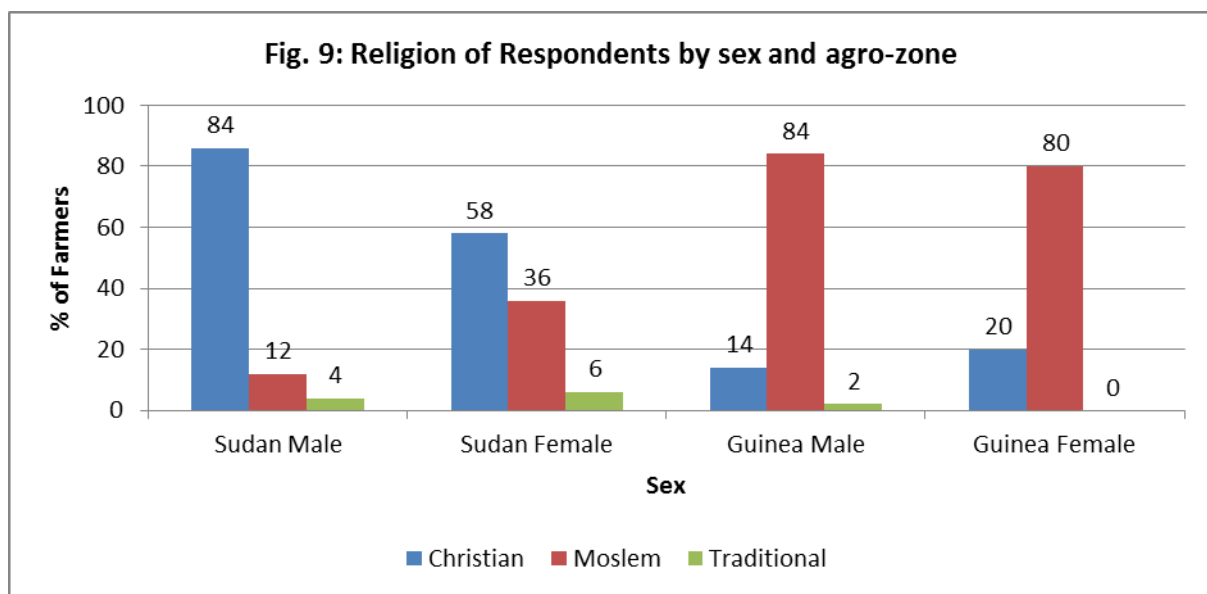
Table 3: Number of Children of Respondents by ecological zone

Children	Sudan		Guinea	
	Male	Female	Male	Female
>7	30	32	16	24
04:07	48	34	28	44
<4	22	34	56	32
Total	100	100	100	100

Source: Survey Data, 2013.

4.2.3 Religion of Respondents

Data collected suggested that Moslems formed the majority in the Guinea Savannah while Christians dominate in the Sudan Savannah with a few Traditionalists in both zones. In the Sudan savannah, males constitute 84% Christians, 12% Moslems, and 4% traditionalist whilst females constitute 58% Christians, 36% Moslems and 6% traditionalist. In the Guinea Savannah, males constitute 14% Christian, 84% Moslem and 2% traditionalist whilst females constitute 20% Christians, 80% Moslems.

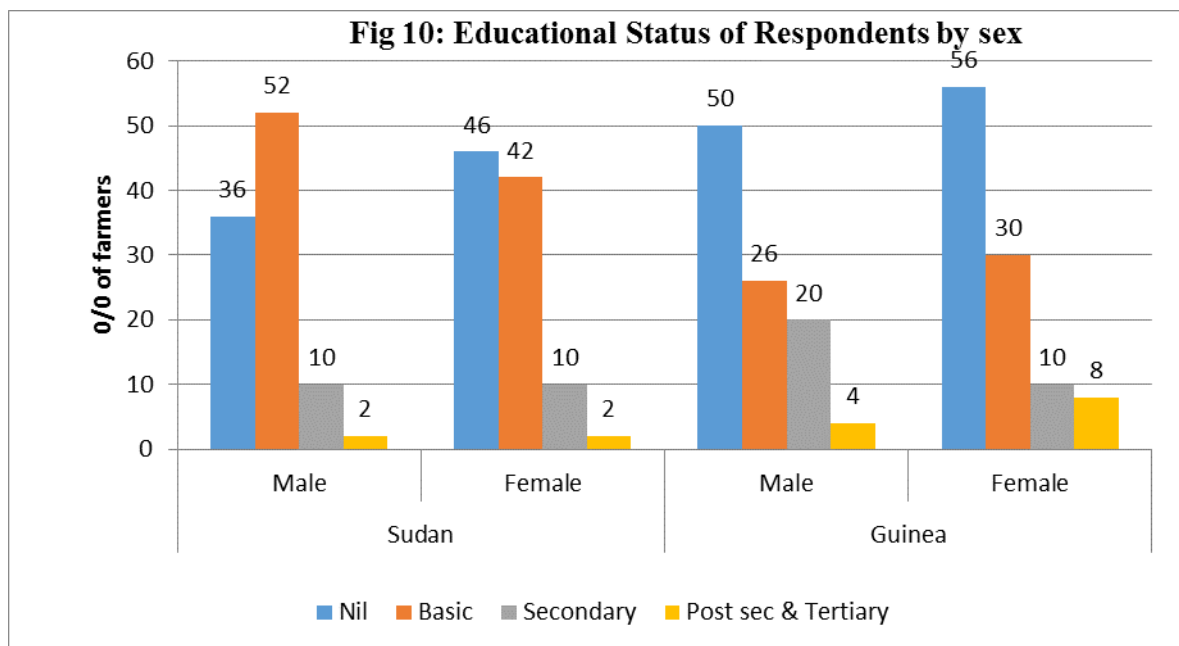


Source: Survey Data, 2013

4.2.4 Level of Education of Respondents

Education is an essential factor for affecting desirable changes in attitudes, skills and knowledge of individuals. The level of education is very low in the two ecological zones as close to half of the respondents (47%) had no formal education. Approximately 26% have had basic education. Those who have completed senior high school constituted only 12.5%. Post-secondary and Tertiary levels of education constitute 2.0% and 1.0 % respectively. In terms of gender, the Sudan Savannah has males constitute 36% with no formal education, 52% have basic education, 10% and 2% have secondary and tertiary education respectively

whilst the female constitute 46% with no formal education, 42% with basic education, 10% and 2% have secondary and post-secondary education respectively. In the Guinea Savannah zone, 50% of males have no formal education whilst 26%, 20% and 4% have basic, secondary and post-secondary education respectively. On the other hand, 56% of females have no formal education whilst 30%, 10%, 2% and 2% have basic, secondary, post-secondary and tertiary education respectively.

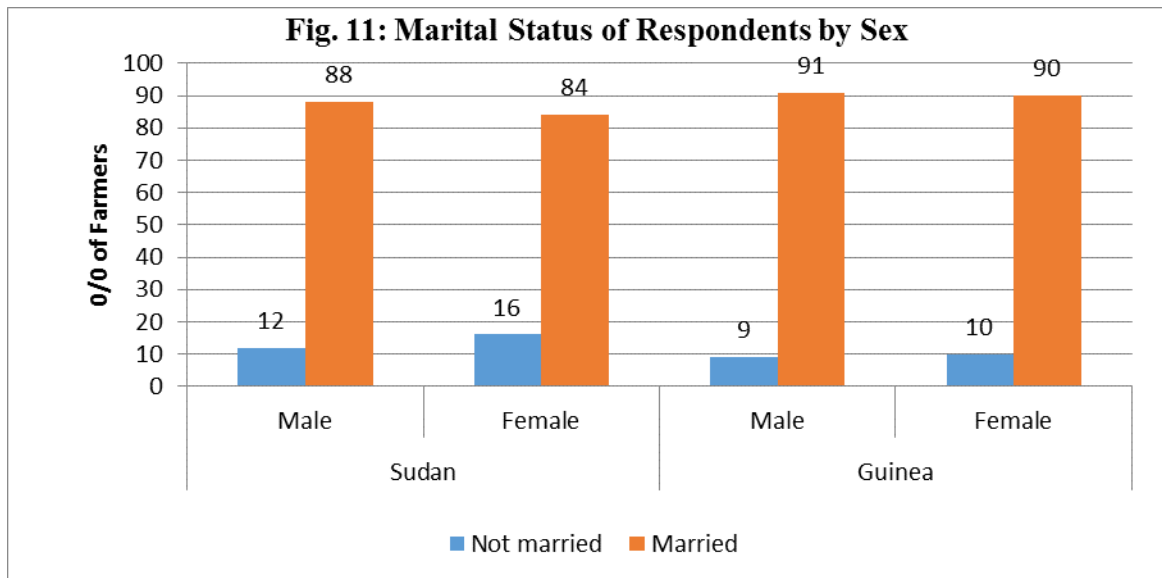


Source: Survey Data, 2013

4.2.5 Marital Status of Respondents

The majority of respondents are married and living with their spouses. In the Sudan ecological zone 88% and 84% of males and females respectively are married. The situation in the Guinea Savannah ecological zone is not different as 91% and 90% of males and females respectively are married and living with their spouses. On the other hand, only 2% and 10% of males and females respectively in the Sudan ecological zones are not married. The

situation in the Guinea Savannah ecological zone is not different as only 3% and 4% of males and females respectively are not married.



Source: Survey Data, 2013

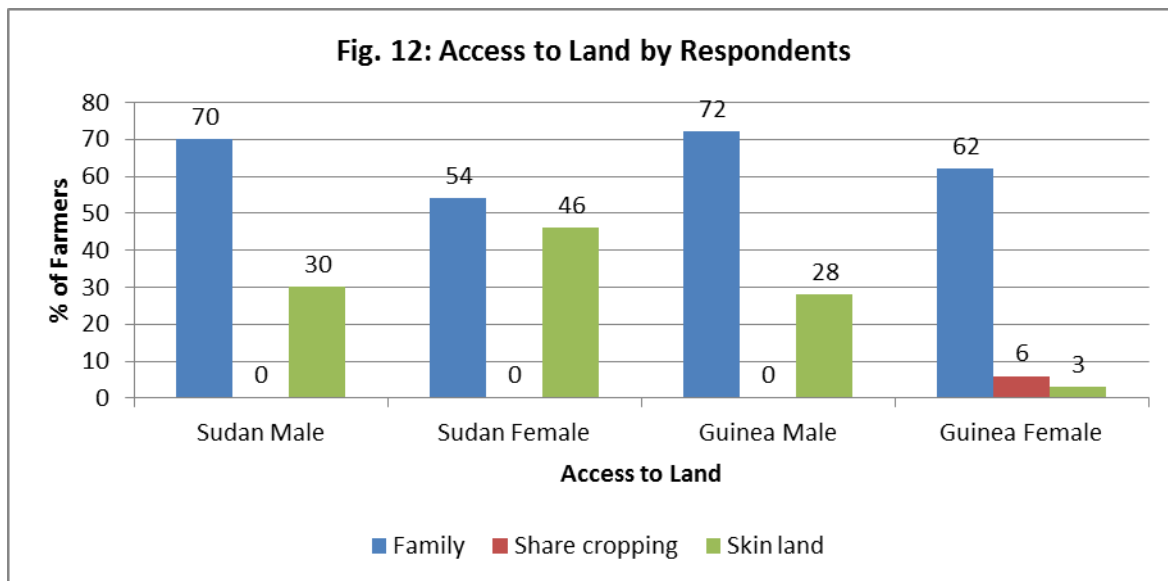
4.3 Smallholder access to resources for agricultural activities

Access to resources for agricultural activities was analyzed and presented under access to labour, improved seeds, fertilizer, insecticides, herbicides, breeding stock of animals, credit and agricultural information segregated into gender and regional basis. This analysis and results allow a clearer understanding of the differences and similarities that exist between males and females regarding access to resources for agricultural activities in the two ecological zones found in Ghana.

4.3.1 Access to land

In the figure 12.0 below, results from the analysis shows that both men and women in the Sudan and Guinea Savannah ecological zones have access to land. Generally, the men in the 2 zones have more access to family land followed by skin land. It is only in the Guinea savannah zone that some few women engage in share cropping. In the Sudan savannah

ecological zone about 70% of male farmers compared to 54% of female farmers have access to land through family sources. However when it comes to land access through skin land, the analysis depicts that about 46 % of female farmers as compared to 30% of male farmers have access to land. In the case of Guinea Savannah ecological zone, about 72% of male farmers compared to 62% of female farmers have access to land through the family. However, a wide disparity exists in access to skin land. About 28% of male farmers as compared to only 3% of female farmers have access to skin land.



Source: Survey Data, 2013.

The Chi Square analysis showed a significant relationship between gender and access to land ($\chi^2 = 0.581$; $df=1$, $p= 0.446$). That is, access to land was dependent on gender in favour of the male farmer. Respondents indicated that the male inheritance system does not allow females to inherit land because these lands may be transferred to other families on the death of a husband or when the female goes out to marry from another family. This was confirmed by Quisumbing and Pandolfelli (2010) that men are given preference over women in accessing land in such patrilineal systems.

The findings of this study are consistent with a number of studies conducted in Ghana and other parts of the developing world (Awumbila, 1997, Kotey and Tsikata; 1998, Ghana Household Asset Survey, 2010; Duncan 2004 and Quisumbing *et al.*, 2001, FAO Gender and Land Rights Database; FAO, 2010). Ghana maintains a plural system of land tenure. Access to land is through family, share - cropping, renting, skin / stool and outright purchase. Access to land is affected by tenurial arrangements and inheritance systems as well as land use patterns.

The terms of tenure, however, differ for men as against women. The land tenure system in the two ecological zones found in Northern Ghana is characterized by communal ownership, with individual lineages headed by men owning portions. Thus theoretically, each member of a kinship group, male or female, has rights to land by virtue of membership of the group. However, in practice, the situation is different. According to the Ghana Household Asset Survey (2010) men are more likely than women to hold inherit land and claim ownership by virtue of being members of land owning families.

The findings of this study, recorded an insignificant number of respondents who acquired land through outright purchase. According to key informants in the Sudan and Guinea savannah ecological zones, selling family land will usually require a consensus, which tends to make the process of buying slow and more expensive.

4.3.2 Access to labour.

Several studies have demonstrated the importance of labour in agriculture. There is evidence to support the linkage between the area cultivated and the ability to mobilise sufficient labour to accomplish all farm operations (Ohene-Yankyera, 2004). Results from the analysis shows

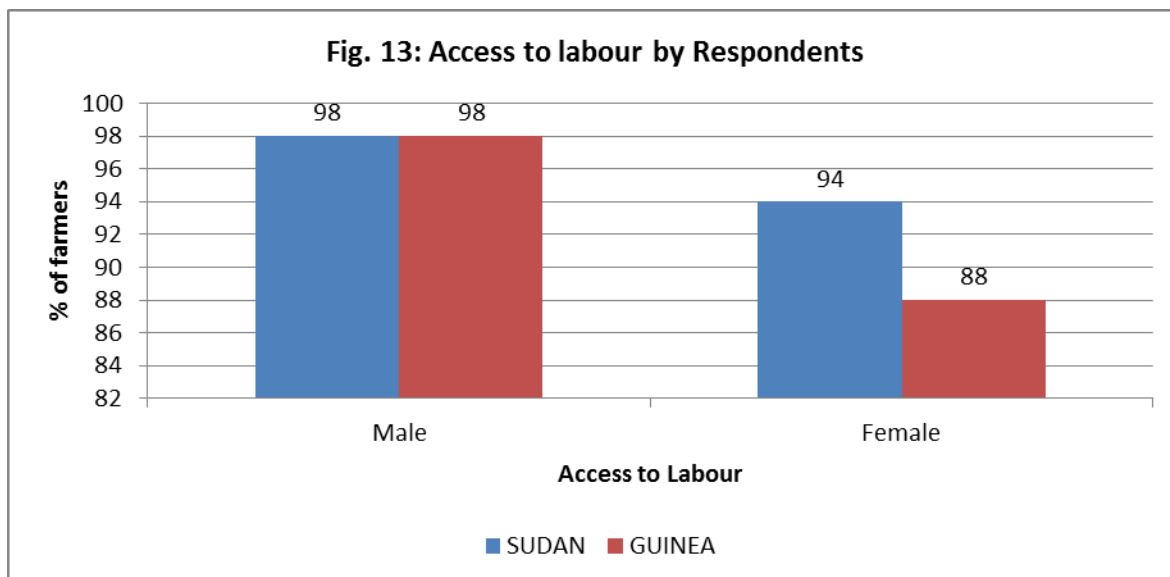
that majority of smallholder farmers have access to labour for agricultural purposes. Males in both ecological zones recorded approximately 98%. Females on the other hand recorded 94% in the Sudan ecological zone as compared to 88% registered in the Guinea savannah ecological zone as depicted in the Figure 13 below. The sources of labour for farming as indicated by the respondents include self and family only (90.3%) indicating a high incidence of self and family as a source of labour for farming with hired mechanization representing an insignificant (1.0%) The rest of the sources such as “nnoboa”, and hired by day labour represent 5.6% and 3.1% respectively.

The statistical analysis shows that there is a significant relationship between gender and access to labour for farming ($\chi^2=4.714$; $df=1$, $p=0.030$) implying that access to labour was dependent on gender in this case, with men having more access than the women. It is likely that since men control the households thus the labour force, they would definitely have more access than the women. It is therefore not surprising that high labour source from self and family recorded a high figure of 90.3%. This finding is consistent with studies by Babatunde et al., (2008). Using bivariate analysis, male-headed households have significantly more hours of labour than female-headed households. However, there were no mean difference in farm output by gender.

Table 4: Relationship between gender and smallholder farmers access to labour

Agro- ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	n	%	Total	N	%	n	%	
Sudan	49	98.0	1	2.0	50 (100)	47	94.0	3	6.0	50 (100)
Guinea	49	98.0	1	2.0	50 (100)	44	88.0	6	12	50 (100)

Source: Survey Data, 2013. $\chi^2 = 4.714$; $df = 1$, $p=0.030$.



Source: Survey Data, 2013.

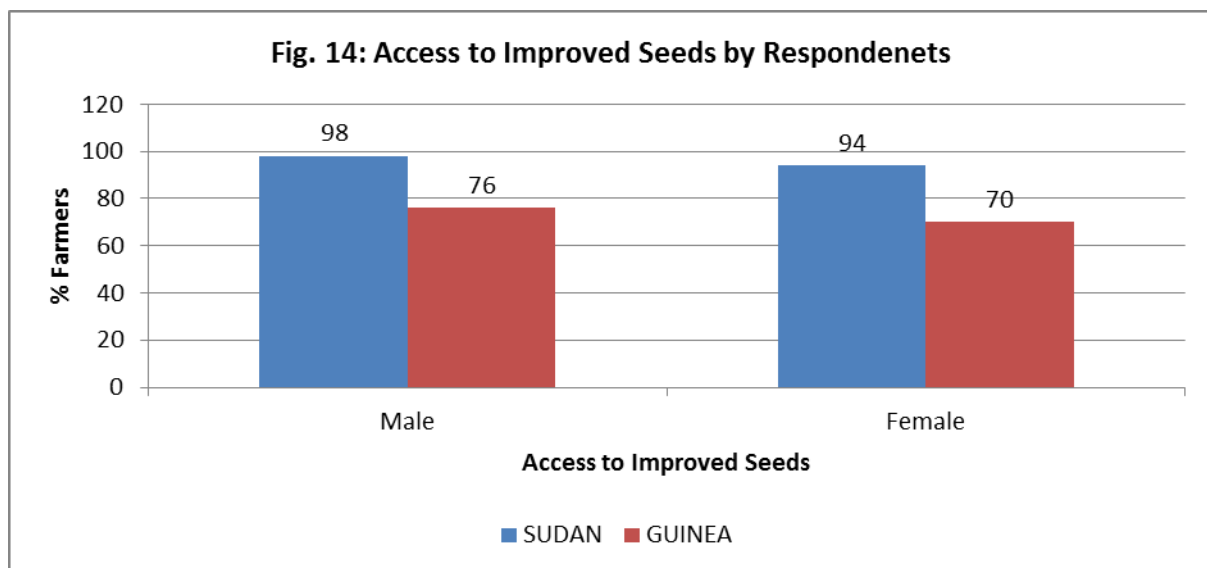


PLATE 1: A group of women farmers as a source of agricultural labour.

4.3.3 Access to improved seeds

According to agricultural research in Ghana, most farmers retain seed especially cereal or legume for planting. Also nearly all seed varieties developed for release in Ghana are open pollinated (OP) varieties with a limited amount of hybrid seed (Ragasa et al., 2012). Results of the analysis shows both men and women have more access to improved seeds in the Sudan

ecological zone than in the Guinea savannah ecological zone. Generally majority (84.5%) of smallholder farmers have access to improved seeds. 98% and 94% of males and females respectively in the Sudan Ecological zone have access to improved seeds. Also 76% of males and 70% of females in the Guinea Savannah Ecological Zones have access to improved seeds as depicted in the Figure 14.0 below. The sources of improved seeds includes the Districts Agricultural Office, market and self, representing 72.6%, 16.1% and 11.3% respectively. The District Agricultural Office is seen by respondents as a source of reliable information and a link for farmers to the market for high quality improved seeds and not necessarily that the District Agricultural Office sells or distribute the seeds to farmers. Conspicuously missing is the Agro chemical and equipment shop as a source of improved seeds. This can be attributed to the infant Agro chemical industry and its location mainly in the capital towns of the ecological zones.



Source: Survey Data, 2013

The statistical analysis shows that there is no significant relationship between gender and access to improved seeds ($\chi^2=0.954$; $df=1$, $p=0.329$). This finding is consistent with Doss and Morris (2001) study in Ghana found that once researchers controlled for access to complementary inputs (land, education, labour), they found no significant difference in rates

of modern seed variety adoption between male and female farmers. Similarly, Horrell and Krishnan (2007) found no significant difference in use among de jure or de facto female-headed households and male-headed households for both maize and all crop samples. The studies by both Chirwa (2005) and Bourdillon et al., (2002) found that the gender of household head has no significant effect on adoption of improved seed in Malawi and Zimbabwe, respectively using probit analysis. Shankar and Thirtle (2005) using Probit Model of Bt (*Bacillus thuringiensis*) adoption finds no significant differences by gender. On the other hand, Ouma et al., (2002) finds gender has a significant association with adoption of improved seeds using logit analysis.

Table 5: Relationship between gender and smallholder farmers access to improved seeds

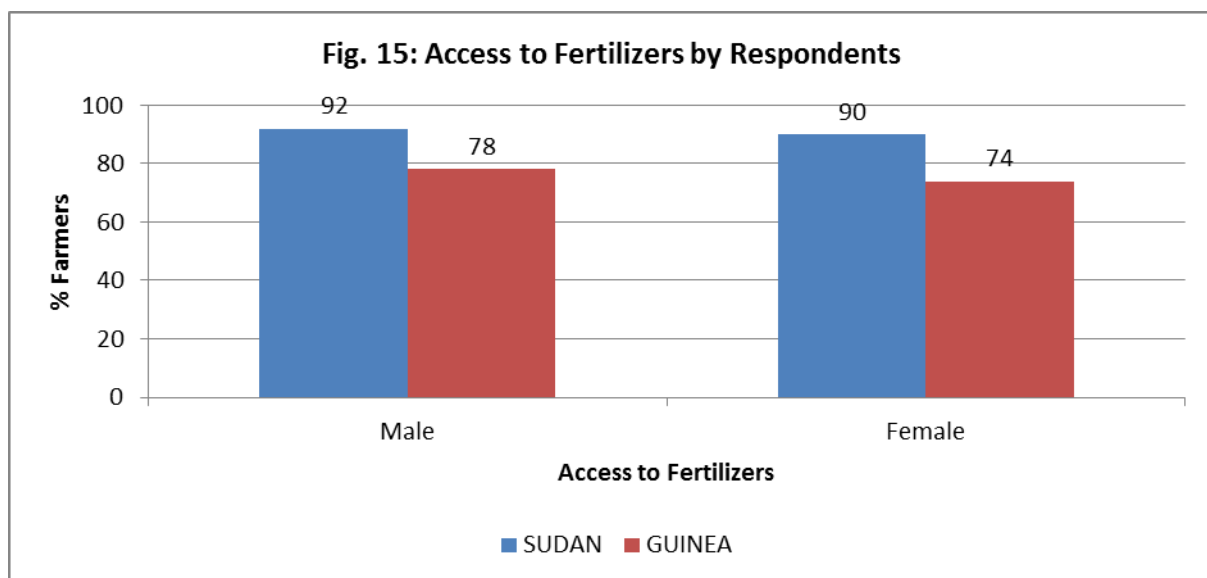
Agro-ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	n	%	Total	N	%	n	%	
Sudan	49	98.0	1	2.0	50 (100)	47	94.0	3	6.0	50 (100)
Guinea	38	76.0	2	24.0	50 (100)	35	70.0	15	30.0	50 (100)

Source: Survey Data, 2013. $\chi^2 = 0.954$; df = 1, p=0.329.

4.3.4 Access to fertilizer for farming

Fertilizer nutrient consumption per ha is low in Ghana at an average of 6kg/ha. This contributes to low yields of major crops: 1.7 tons/ha for maize and 2.4 tons/ha for rice. Meanwhile, fertilizer application rate is 40 kg/ha (MOFA, 2010). According to the Ghana Living Standards Survey Report of the Fifth Round (GLSS 5, 2008) 19% of households in Ghana reported having access to inorganic fertilizer during 2005-2006.

Results of the analysis show that both men and women have more access to fertilizer in the Sudan ecological zone than in the Guinea savannah ecological zone. Generally over 74% of smallholder farmers have access to fertilizer for farming with more males (70%) having access than females as depicted in the Figure 15 below. The source of fertilizer as indicated by respondents include (70.3%) from the District Agricultural Office, with the rest from the market (29.7%). Once again the role of the District Agricultural Office is that of a reliable source of information on where to get fertilizer for purchase. Also partly because of MOFA's Fertilizer Subsidy Programme which has increased the availability and access to fertilizers in the market.



Source: Survey Data, 2013

The statistical analysis shows that there is no significant relationship between gender and access to fertilizer ($\chi^2=0.327$; $df=1$, $p=0.568$). From the chi – square test therefore, access to fertilizer is not dependent on gender as figure 10 depicts a high accessibility of fertilizer by both males and female farmers in the Sudan and Guinea savannah ecological zones. This is confirmed by other studies such as; Doss and Morris's (2001) study of 420 maize farmers in Ghana, which found that once researchers controlled for access to complementary inputs

(land, education, labour), they found no significant difference in rates of adoption between male and female farmers.

Also, Freeman and Omiti (2003) and Bourdillon et al. (2002) found that the gender of household head has no significant effect on adoption and intensity of use of inorganic fertilizer in 399 households in Kenya and among stratified samples of 136 to 200 households in Zimbabwe. In a sample of 156 households in Malawi, Chirwa (2005) found men and women plot owners do not differ significantly with respect to fertilizer adoption. Horrell and Krishnan (2007) found no significant difference in maize yields achieved or fertilizer usage by female household heads in Zimbabwe.

Similarly, Thapa (2009) found little evidence for gender differences in value of farm output in 2,360 Nepalese households after controlling for access to inorganic fertilizer and other key inputs. Gilbert, Sakala, and Benson (2002) analyzed a cropping system trial survey in Malawi and found a significant gender difference in fertilizer use among the 1,385 farmers selected to participate in the trial. Following a treatment period in which all participants were supplied with inorganic fertilizer inputs, the authors found no significant gender difference in maize yield.

Table 6: Relationship between gender and smallholder farmers access to fertilizer

Agro- ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	N	%	Total	n	%	n	%	
Sudan	46	92.0	4	8.0	50 (100)	45	90.0	5	10.0	50 (100)
Guinea	39	78.0	11	22.0	50 (100)	37	74.0	13	26.0	50 (100)

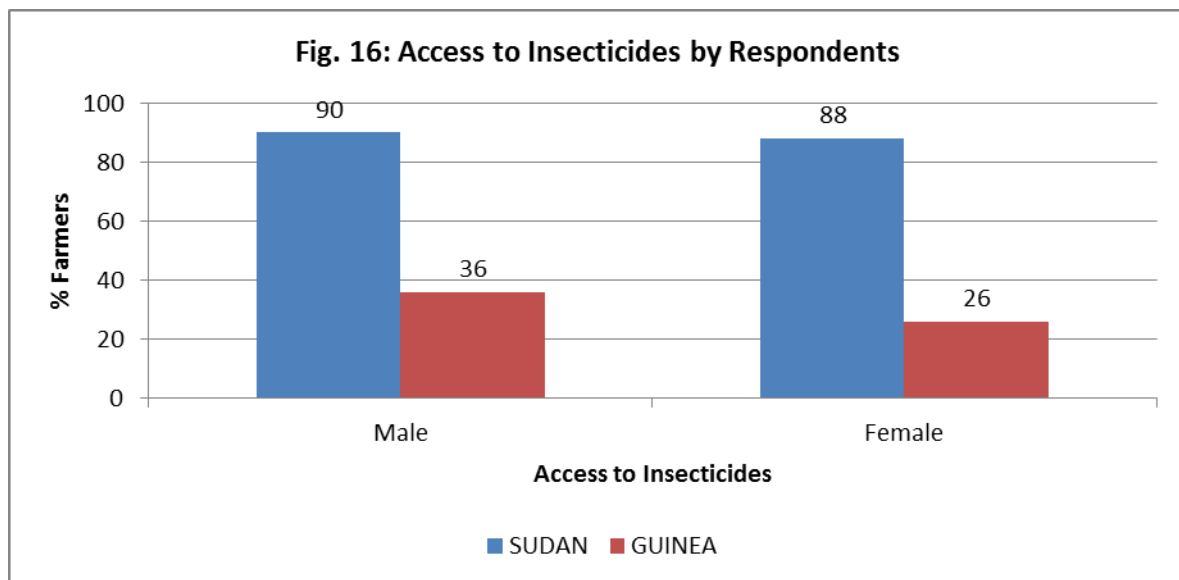
Source: Survey Data, 2013. $\chi^2 = 0.327$; df = 1, p=0.568.

4.3.5 Access to insecticides

Results of the analysis show that both men and women have access to insecticides in the Sudan ecological zone than in the Guinea savannah ecological zone. Generally majority of smallholder farmers in the Sudan savannah have access to insecticides for agricultural purposes as depicted in the Figure 16.0 below. Male farmers in the Sudan savannah posted high accessibilities 90% as compared to female farmers (88%). This compares with the Guinea savannah zone that indicate lowest access (26%) for females and (36%) for males. The source of insecticides as indicated by respondents include 81.8% and 18.2% from the District Agricultural Office and the market respectively.

The statistical analysis shows that there is no significant relationship between gender and access to insecticides ($\chi^2=0.750$; $df=1$, $p=0.386$). From the test therefore, access to insecticide is not dependent on gender. In the guinea savannah where low accessibility of insecticides is recorded applies to both males and females and vice-versa in the Sudan ecological zone.

This finding is consistent with studies conducted by Jagger and Pender (2006) where they used a two-stage model to examine program effects on pesticide adoption among 451 Ugandan households and found female headship is insignificant in predicting adoption. However, Kinkingninhoun-Médagbé and colleagues' (2008) study of 45 rice farmers in Benin found significant gender differences in farmers' use of pesticide, which they largely attribute to gender-based discrimination.



Source: Survey Data, 2013

Table 7: Relationship between gender and smallholder farmers access to insecticides

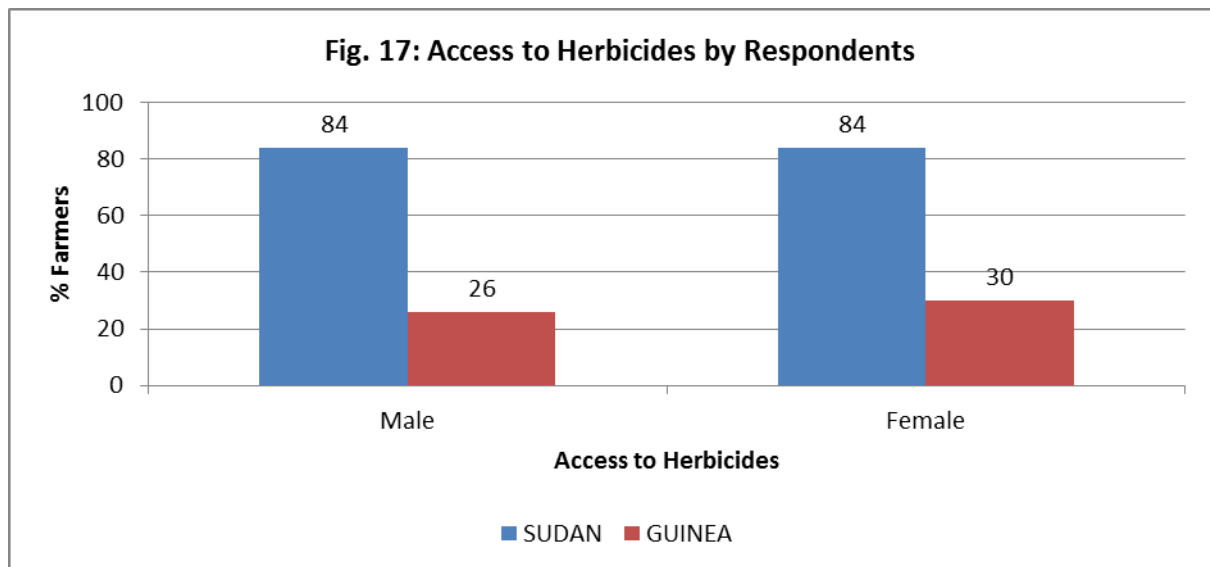
Agro-ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	N	%	Total	n	%	N	%	
Sudan	45	90.0	5	10.0	50 (100)	44	88.0	6	12.0	50 (100)
Guinea	18	36.0	32	64.0	50 (100)	13	26.0	37	74.0	50 (100)

Source: Survey Data, 2013. $\chi^2=0.750$; df = 1, p=0.386

4.3.6 Access to herbicides

Results of the analysis show that both men and women have access to herbicides in the Sudan ecological zone than in the Guinea savannah ecological zone. Generally majority of smallholder farmers in the Sudan ecological zone have access to herbicide as depicted in the Figure 17 below for agricultural purposes. A high of 84% for the Sudan savannah is an apt description of the trend of affairs concerning both males and females. Relating to smallholder farmers' access to herbicides in the Guinea savannah, the analysis points to the following

trend: females recorded slightly higher accessibility 30% than males (26%) but it is worth noting that generally the level of accessibility is relatively small. The source of herbicides as indicated by respondents include (71.1%) from the District Agricultural Office and (22.9%) from the market.



Source: Survey Data, 2013

The statistical analysis shows that there is no significant relationship between gender and access to herbicides ($\chi^2=0.081$; $df=1$, $p=0.776$). Access to herbicides is therefore not dependent on gender as farmers (both males and females) in the Sudan Savannah ecological zone recorded a high level of accessibility. The low level of accessibility in the Guinea Savannah Ecological zones for both males and females could be explained by Rogasa et al., (2013) where accessibility of herbicides in the Guinea Savanah zone was 39% as compared to other ecological zones. They explain this may be due to less prevalence of weeds or greater availability of labour or both in the northern savannah zone than in the south. Herbicides application rate according to them is 5.3 litres/hectares which is also lowest in Guinea Savannah.



PLATE 2: A group of farmers being introduced to agro chemicals

Table 8: Relationship between gender and smallholder farmers access to herbicides

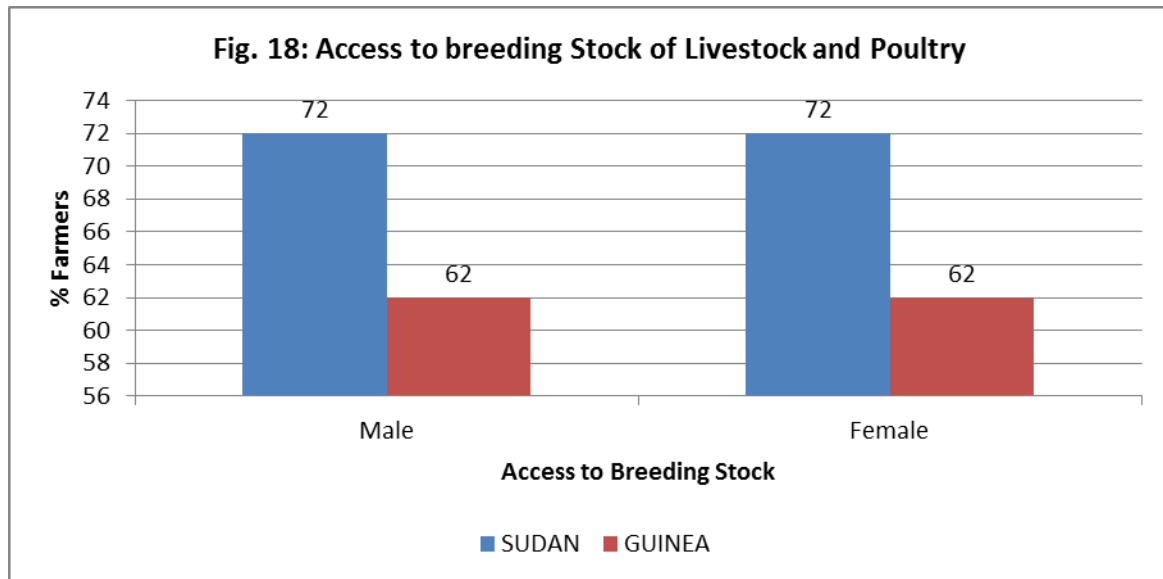
Agro- ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	N	%	Total	N	%	n	%	
Sudan	42	84.0	8	16.0	50 (100)	42	84.0	8	16.0	50 (100)
Guinea	13	26.0	37	74.0	50 (100)	15	30.0	35	70.0	50 (100)

Source: Survey Data, 2013. $\chi^2 = 0.081$, df = 1, p=0.776

4.3.7 Access to breeding stock of animals

Analysis shows that both men and women have equal access to breeding stocks of livestock and poultry in the 2 ecological zones as depicted in the figure 18 below. From the analysis 72% of males and females in the Sudan savannah had access to breeding stocks. With respect

to the Guinea savannah ecological zone, 62% of farmers both males and females had access to breeding stocks.



Source: Survey Data, 2013

The source of breeding stocks as indicated by the respondents is mainly the market accounting for nearly 98% with other sources such as friends and other farmers and District Agricultural Office accounting for 0.7% and 1.4% respectively. The statistical analysis shows that there is no significant relationship between gender and access to breeding stocks ($\chi^2=0.23$; $df=1$, $p=0.880$).

However, Gurung et al., (2005) study on access to and control over resources for livestock management activities in Chapagaon, Lalitpur district (mid hill region in Nepal) reported that females' have more access to and control over livestock consumption activities and use of agricultural products in livestock. However, access to livestock farming as a main occupation and decision on access to livestock selling are mainly male jobs. Similarly access to and control over livestock business and other economic activities for livestock management (e.g. burrowing and lending money and investment), spending of household income for various activities (household expenditure, education/health, livestock development, starting new occupation etc.), sell /collateral for livestock are more of male jobs

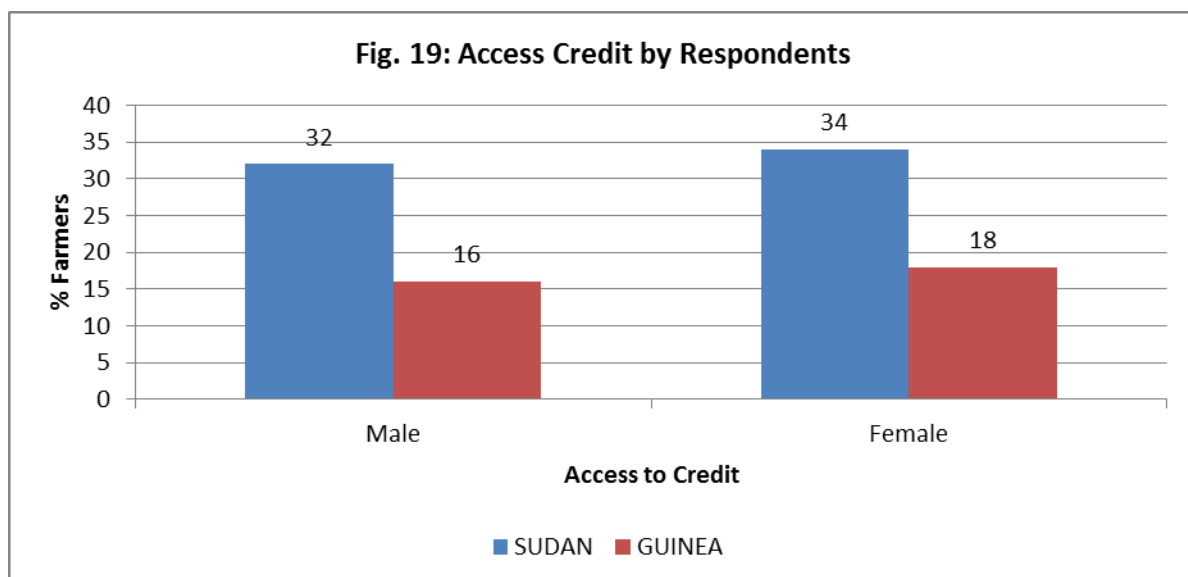
Table 9: Relationship between gender and smallholder farmers access to breeding stock of poultry

Agro- ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	N	%	Total	N	%	n	%	
Sudan	36	72.0	13	26.0	50 (100)	36	72.0	14	28.0	50 (100)
Guinea	31	62.0	19	38.0	50 (100)	31	62.0	19	38.0	50 (100)

Source: Survey Data, 2013. $\chi^2 = 0.23$, df = 1, p=0.880

4.3.8 Access to credit

Figure 19 below reveals the nature of smallholder farmers' access to credit for agricultural activities by ecological zones. The result indicates that both men and women have more access to credit in the Sudan ecological zone than in the Guinea savannah ecological zone. In terms of male-female differences in access to credit, females have more access than men in both the Sudan and Guinea savannah ecological zones. However the level of accessibility is relatively small.



Source: Survey Data, 2013

The statistical analysis shows that there is no significant relationship between gender and access to credit ($\chi^2=0.107$; $df=1$, $p=0.744$). Credit is therefore not dependent on gender. Research on access to credit by men and women produced mixed results. FAO (2011) indicated that credit markets are not gender neutral. Mehra and Rojas (2008) for example observed that women have more access to credit than men while FAO (2012) indicated that while there is little notable difference between men and women's access to credit, market oriented women farmers have significantly better access to NGO and co-operative credit sources as compared to men. In another situation, credit institutions are believed to ration women out of the market or grant the women smaller loans as compared to men for similar activities (Fletschner, 2008).

The amount of money obtained as credit ranged from GHC 500 - GHC2, 000. These amounts of money were obtained mainly from Rural Banks, Susu Operators, Microfinance Institutions, Friends and Money lenders. The Microfinance Institutions supplied the highest amounts of money to the farmers and this is followed by the Rural Banks as depicted in the Figure 15 below. The highest amounts provided by the Microfinance Institutions are found in the Sudan and Guinea savannah zones. The farmers enumerated some problems they face while assessing credit facilities. These are inadequate amounts being provided; credit facilities not provided on time, difficult processing, high interest rates and unfavourable payment conditions.

Table 10: Relationship between gender and smallholder farmers access to credit

Agro- ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	N	%	Total	N	%	n	%	
Sudan	16	32.0	34	68.0	50 (100)	17	34.0	33	66.0	50 (100)
Guinea	8	16.0	42	84.0	50 (100)	9	18.0	41	82.0	50 (100)

Source: Survey Data, 2013. $\chi^2 = 0.107$, df = 1, p=0.744

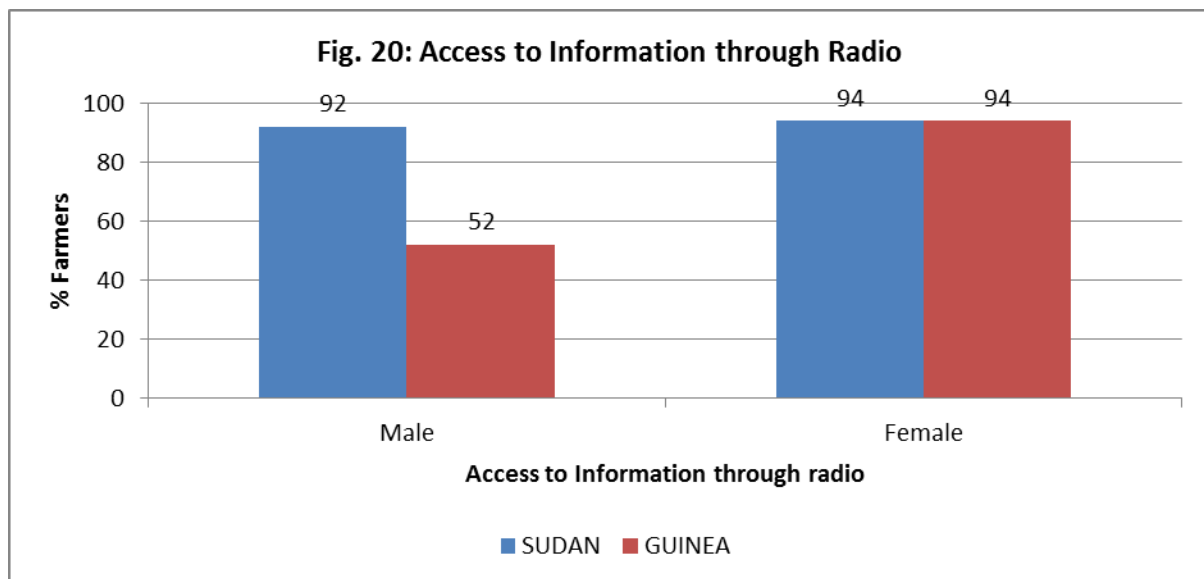
4.3.9 Access to Agricultural Information

The sources of agricultural information have been discussed under radio, Television, Mobile phone, Internet, Journals, input suppliers and Agricultural Extension Agents.

Access to Agricultural Information through Radio

The figure 20 below shows high level of access to agricultural information through the radio as major channels for delivery of agricultural information to farmers in Ghana. The distribution shows that the Sudan savannah zone has 94% of women accessing the radio for agricultural information as against 92% of the men. One finding also worth mentioning is the result from the guinea savannah. In this zone, 52% of male as compared to a high figure of 94% of female farmers held that they have been accessing agricultural information through the radio. One may consider access to radio, availability of clear radio reception and availability of suitable agro-based radio programs as crucial points to ponder. The statistical analysis shows that there is no significant relationship between gender and access to agricultural information through radio ($\chi^2=0.000$; df=1, p=1.000).

This finding is consistent with Chaboussou et al., (2008) after controlling for other factors found that the gender variable is mostly insignificant. However, in Ethiopia, the majority of women (53.7%) did not have access to any combination of newspaper, radio and television or other media, while a lesser proportion of men (33%) did not have access to the same types of media (Ethiopian Society of Population Studies, 2008).



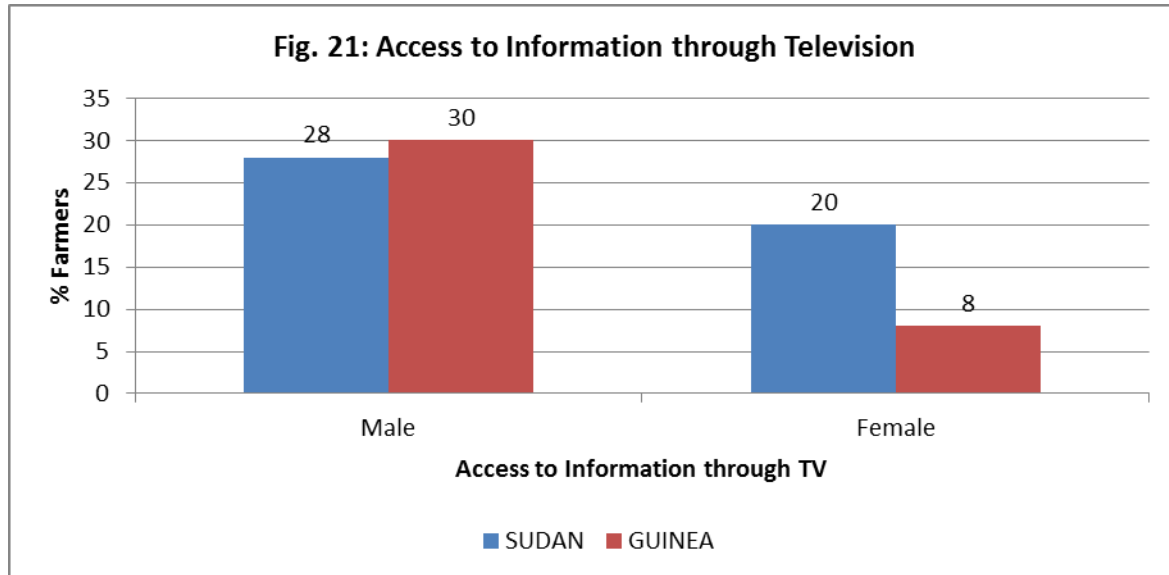
Source: Survey Data, 2013

Access to agricultural information through Television

Results of the analysis show that generally majority of smallholder farmers do not access agricultural information through television. As depicted in Figure 21, responses from the Sudan and Guinea savannah ecological zones post a near 80% (female) and 72% (male) yes to agricultural information through television in the Sudan ecological zones. A similar picture hold true for the Guinea savannah ecological zones as respondents post a near 70% (male) and 92% (female) yes to agricultural information through television. From a very low of 8% (female) to a maximum of 30% (males) in the guinea savannah zone responded *no to have access to agricultural information through television whilst* 20% (female) to 28% (male) in

the Sudan ecological zone responded *no to have access to agricultural information through television* . On the hand, where it appeared many access agro-info through the television the population falls below 35% of the sample. Perhaps possession of television set and how timely agro-based information is put on air must be a cogent issue to contend with. The statistical analysis shows that there is a significant relationship between gender and access to agricultural information through Television ($\chi^2=6.666$; $df=1$, $p=0.010$).

This finding is in contrast with Chaboussou et al., (2008) after controlling for other factors found that the gender variable is mostly insignificant. However, in Ethiopia, the majority of women (53.7%) did not have access to any combination of newspaper, radio and television or other media, while a lesser proportion of men (33%) did not have access to the same types of media (Ethiopian Society of Population Studies, 2008).



Source: Survey Data, 2013

Table 11: Relationship between gender and smallholder farmers access to agricultural information through television.

Agro-ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	N	%	Total	N	%	n	%	
Sudan	36	72.0	14	28.0	50 (100)	40	80.0	10	20.0	50 (100)
Guinea	35	70.0	15	30.0	50 (100)	46	92.0	4	8.0	50 (100)

Source: Survey Data, 2013. $\chi^2 = 6.666$; df = 1, p=0.010

Access to agricultural information through the Mobile Phone

Access to agricultural information through the mobile phone is increasingly becoming an important tool in information dissemination. Results of the analysis show that a very large majority of smallholder farmers do not access agricultural information through the mobile phone. Across the zones did it become clear that there is not a single one that posts more than 2% yes to the question of mobile phone and agricultural information from Agricultural Extension Agents or e-service providers. Those who have the mobile phones explained that apart from social interactions, they sometimes communicate with one another on issues relating to farming. Clearly males and females scored 0% in the Guinea savannah. This is not surprising as recent study found women in Africa, the Middle East, and South Asia to be, respectively, 23, 24, and 37 percent less likely than their male counterparts to own a mobile phone, a key communication technology (World Development Report, 2012). Here consideration should be given to the availability of the facility providers-those agricultural services that are accessed through the mobile telephony. Thoughts should as well, be given to the timing of such services. Many a farmer, it is suspected, might not be aware of the availability of such an avenue.

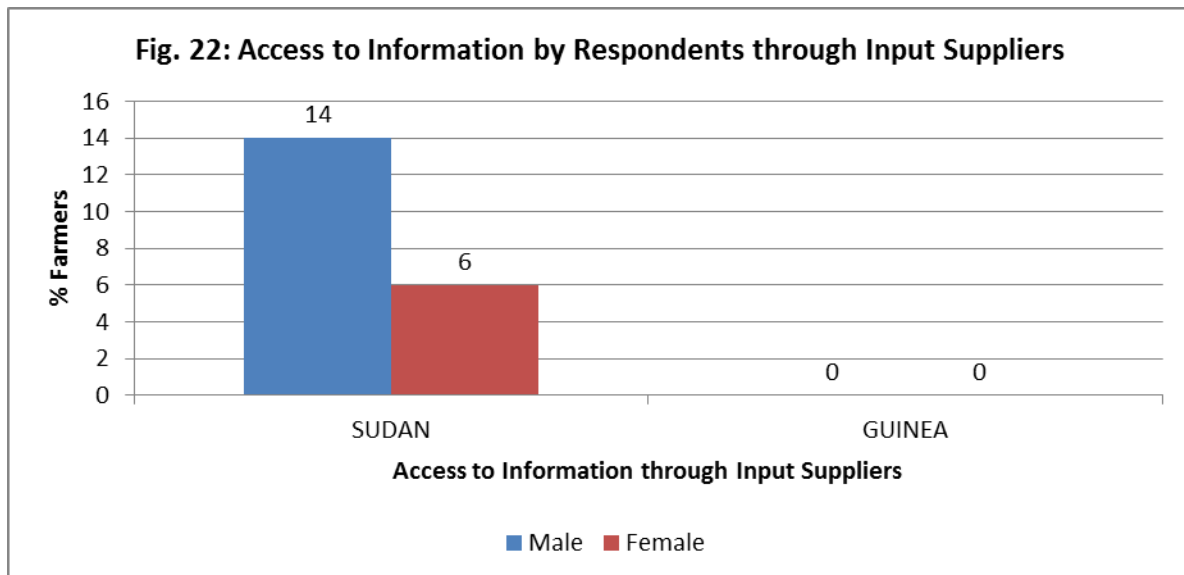
Access to agricultural information through the Internet and Journals

Results of the analysis is indicative of the position that farmers (both males and females) in the Sudan and Guinea savannah ecological zones in Ghana do not access agricultural information via the internet and Journals. This assertion is as a result of the 0% response posted by both males and females in the ecological zones. This speaks volumes of how dire the ICT deficit is in the two ecological zones, the absence of appropriate literature, poor reading habit, lack of literacy skills amongst others.

Access to agricultural information through input suppliers

Input suppliers usually give advice on inputs especially on chemicals that are being sold to farmers. Through this channel, some farmers get very good information on how to use these chemicals. Using the Input Supplier Model, Clark (2012) observed that input suppliers can be an effective and sustainable way of providing input and extension. However, Thapa (2009) has reservations of the quality of inputs and technical recommendations because there are no monitoring mechanisms for such services.

Results of the analysis indicate that access to agricultural information through input suppliers represent only 14% and 6% of males and females in the Sudan savannah ecological zones respectively and 0% for males and females in the Guinea savannah ecological zones as depicted in the Figure 22 below.



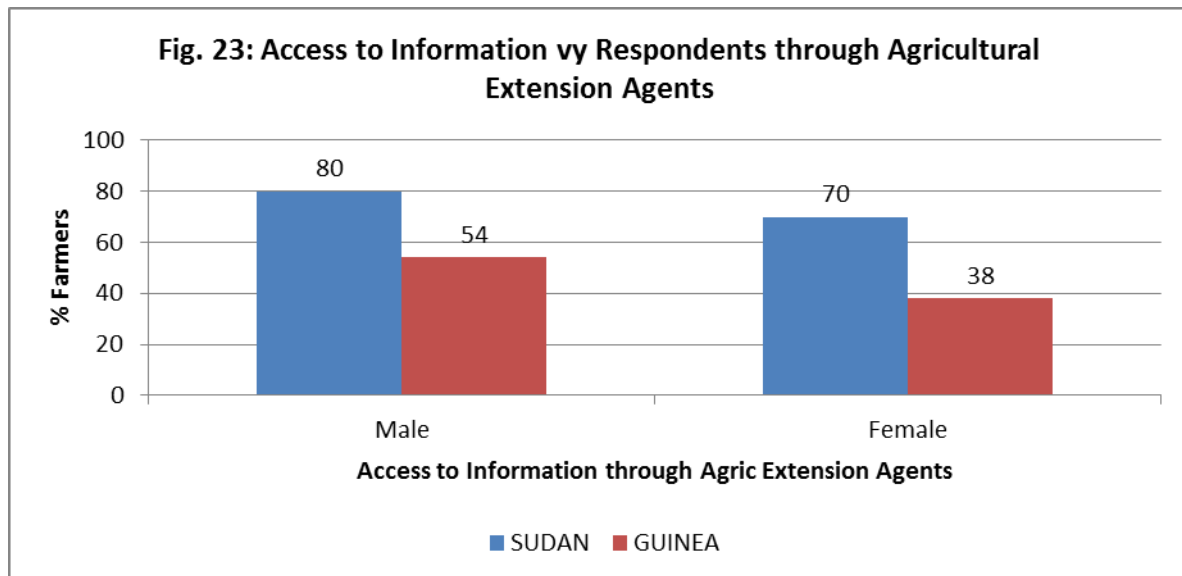
Source: Survey Data, 2013

Access to agricultural information through Agricultural Extension Agents (AEAs)

Results from the data analysis point to one direction which is that Agricultural Extension Agents serve as major sources of agricultural information to farmers across the ecological zones in Ghana as depicted in the Figure 23 below. However said about these agents, one cannot fail to notice that it is less than 40% of females in the Guinea savannah zone who access agro-based information from them. Another noticeable result is that an appreciably high number of male farmers in the Sudan and Guinea savannah zones access information from the AEAs. Perhaps the *modus operandi* of the AEAs in these zones could be studied for possible adaptation in the other zones.

The statistical analysis shows that there is a significant relationship between gender and access to agricultural information through AEAs ($\chi^2=3.536$; $df=1$, $p=0.050$). This finding is consistent with a number of studies. Even though extension services favoured men more than women in many countries (FAO, 2011), Doss and Morris (2001) observed that in Ghana, female farmers in male-headed households have equal contact with extension agents but female farmers in female-headed households have much less contact. However, FAO (2011)

observed that service providers tend to approach male farmers more often than female farmers because of the general misperception that women do not farm and that there would be a “trickle down” effect from male household heads.



Source: Survey Data, 2013



PLATE 3: A group of farmers interacting with an agricultural extension officer

Table 12: Relationship between gender and smallholder farmers access to agricultural information through agricultural extension agents (AEAs)

Agro- ecological zone	Male					Female				Total
	Yes		No			Yes		No		
	N	%	N	%	Total	N	%	n	%	
Sudan	10	20.0	40	80.0	50 (100)	15	30.0	35	70.0	50 (100)
Guinea	23	46.0	27	54.0	50 (100)	31	62.0	19	38.0	50 (100)

Source: Survey Data, 2013. $\chi^2 = 3.536$; df = 1, p=0.050

4.4 General Constraints faced by farmers (male and female) in accessing agricultural resources

Farmers in the two agro ecological zones of the Sudan and Guinea savannah face general constraints in accessing agricultural resources. The Table 13.0 below summarizes these constraints.

Table 13.0: General constraints in accessing agricultural resources by ecological zone and gender

Agricultural Resources	Constraints					
	Guinea Savannah	Frequency		Sudan Savannah	Frequency	
		Male	Female		Male	Female
Improved seeds	Poor access/high costs	25	30	High costs	30	70
	Seed buyer exploitation	10	35			
Labour for farming	Not applicable	-	-	High labour costs	35	65
Land for farming	Not applicable	-	-	Land shortage	32	68
Fertilizer	High cost of fertilizers.	40	60	High Fertilizer costs	35	65
Insecticides	Poor access and high cost of Insecticides	40	60	high cost of insecticides	40	60
Herbicides	High cost of Agro chemicals such as herbicides	20	30	High costs of herbicides	38	62
	Poor knowledge of herbicides and weedcides	10	40			
Breeding Stocks	Mortality and morbidity of breeding stocks e.g. poultry	50	50	Poor access to Veterinary services and Lack of training in livestock production	35	65
Credit	Financial difficulties especially poor or lack of access to Credit	38	62	Financial difficulties especially poor of or lack of access to credit	35	65
Agricultural information	Poor access to agricultural extension services	36	64	Not applicable		

From table 13.0 it is evident that the general constraints faced by women includes high cost of agricultural inputs such as fertilizer, herbicides, insecticides and improved seeds in both ecological zones. This may probably due their low economic power as compared to men. Few women also reported land shorted as a constraint in the Sudan ecological zone. In the Guinea Savanna ecological zone both men and women face equal challenge of mortality and morbidity of breeding stocks. It is however interesting to know that in the Guinea Savannah zone no constraints were reported on land and labour for farming by both men and women likewise poor access to agricultural extension services in the Sudan ecological zone.

In addition to the above, the Guinea savannah ecological zone has peculiar agricultural problems as such as;

- Bush fires
- Combine harvesters inadequate
- Poor access to irrigation facility
- Market price fluctuations
- Pests of crops
- Post-harvest losses
- Poor rainfall
- Poor access roads
- Low soil fertility
- Poor access to storage facilities
- High tractor costs
- Training of farmers poor
- Transport costs
- Low yields of crops

The Sudan savannah ecological zones on the other hand have the following challenges;

- Too few bullocks for ploughing
- Bush fires
- Birds invasion on millets
- Combine harvesters inadequate
- High water levy charges
- Poor access to irrigation facility
- Market price fluctuations/low
- Overgrazing
- Pests of crops /diseases
- Poor rainfall and on the other hand, floods sometimes
- Low soil fertility
- Poor storage facilities
- Stray animals destroying crops
- Poor access to tractor services and high costs
- Transportation poor
- Low yields of crops

4.5 The Socio-economic Characteristics of farmers and access to agricultural resources

There are different socio-economic factors that affect access to and control over agricultural resources. The socio-economic factors that are considered are educational level and marital status as against access to the resources being studied. Gender as a variable has been

discussed extensively. What informed the choice of these variables is the limitation of empirical study on the other variables.

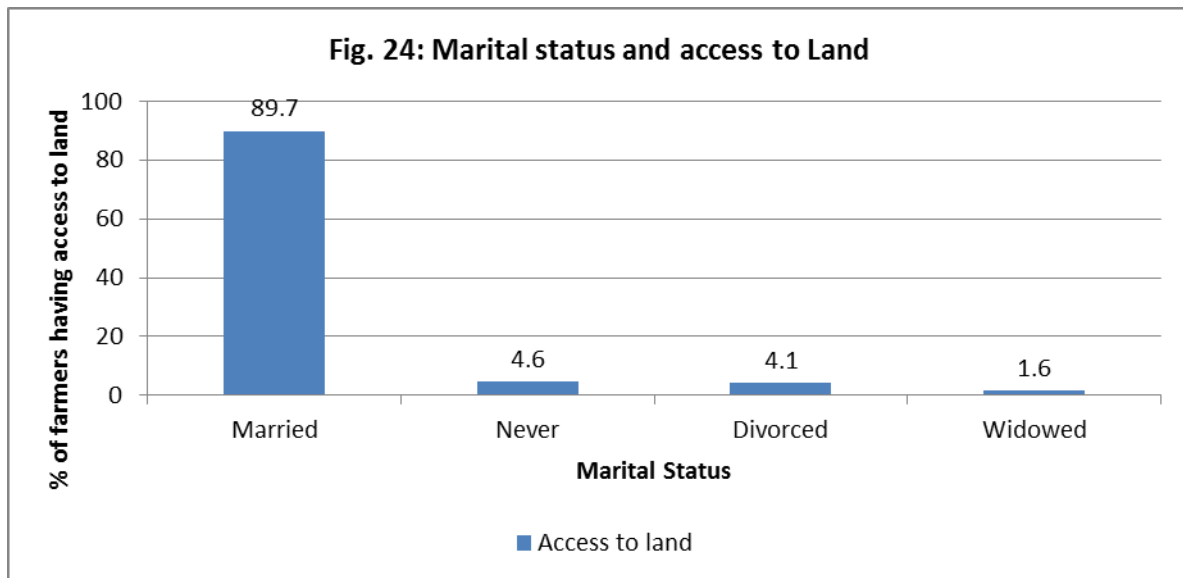
4.5.1 Marital status and access to land

It can be observed from the figure 24 below that 89.7% of married respondents have access to land. The rest of the respondents (below 5%) had access to land. There were four categories of marital status but for the chi-square condition to be satisfied some cells were combined. The Fisher's Exact value of 6.982 and p-value of 0.0943 indicates that there is no significant relationship between respondents who were married and those who are not married in their access to land. This shows that marital status does not influence access to land even though 89.7% of respondent who are married had access to land for farming. This is in contrast to the Ghana household survey (2010) which revealed that one's marital status had a significant impact on access to land and control over land. However, Duncan (2001) also had similar findings which revealed that one's marital status had a significant impact on access to and control over land.

Table 14.0 Marital status and access to land for farming

Marital Status	Access to land for farming		Total
	Yes	No	
Married	175	3	178
Not married	20	2	22
Total	195	5	200

Source: Survey Data, 2013 $\chi^2 = 6.982$, df = 1, 0.p = 0.0943 NS



Source: Survey Data, 2013

4.5.2 Marital status and access to credit

The distribution in Table 15.0 clearly shows that majority (134) of married respondents have no access to credit. There were four categories of marital status but for the chi-square condition to be satisfied some cells were combined. At the 5% level of significance, there is no significant statistical relationship between marital status and access to credit. This is confirmed by the Yates corrected value of 0.068 and p-value of 0.7941 respectively. This indicates that access to credit does not depend on marital status. It is therefore not surprising that majority (134) of married respondents have no access to credit. This is confirmed by Okunade (2007) that marital status had no significant relationship with access to credit. On the other hand, a study conducted by Odoh et al., (2009) found that marital status and access to credit are statistically significant at 5% and 10% as having strong effect on the amount of loan obtained by the smallholder cassava farmers.

Table 15 Marital status and access to credit

Marital Status	Access to credit		Total
	Yes	No	
Married	44	134	178
Not married	6	16	22
Total	50	150	200

Source: Survey Data, 2013. $\chi^2 = 0.068$, df=1 and p - value of 0.7941 NS

4.5.3 Marital status and access to labour

As depicted in Table 16.0 below, the distribution points clearly to the fact that majority of respondents (170) who are married have access to labour for farming. There were four categories of marital status but for the chi-square condition to be satisfied some cells were combined. The Yates-corrected value and p-value of 1.63869 and 0.2010 respectively indicate that there is no statistical significant relationship between marital status and access to labour. Thus marital status does not influence access to labour even though majority (170) of married respondents have access to labour for farming. This is not surprising as spouses constitute a majority of sources of agricultural labour generally unpaid working on land owned by spouses and families. This finding is confirmed by the World Bank (2009) Gender in Agriculture source Book and the Ghana Household Survey (2010).

Table 16.0 Marital status and access to labour for farming

Marital Status	Access to labour for farming		Total
	Yes	No	
Married	170	8	178
Not married	19	3	22
Total	189	11	200

Source: Survey Data, 2013 $\chi^2=1.63869$, df =1, p- value = 0.2010

4.5.4 Education and access to credit

The Table 17.0 below show that majority (72) of respondents who had no education had no access to credit. There were five categories of educational status but for the chi-square condition to be satisfied some cells were combined. The above basic category includes secondary, post-secondary and tertiary levels of education. When subjected to the chi square test, the Yates-corrected value and P – value of 0.588 and 0.7452 respectively indicate that education has no significant relationship with access to credit. This confirms studies by Adewale and Ogunniyi (2000) that formal education of farmers have no significant relationship with their access to credit. It is therefore not surprising that majority of

respondent have no access to credit. However, a study by FAO (2001) attributed such a situation to complex and intimidating administrative procedures which hold back farmers with low levels of education.

Table 17.0 Education and access to credit

Educational level	Access to credit		Total
	Yes	No	
Nil	22	72	94
Basic education	18	57	75
Above basic education	10	21	41
Total	50	150	200

Source: Survey data, 2013 $\chi^2 = 0.588$, df = 2, p-value = 0.7452 NS

4.5.5 Education and Access improved seeds

The Table 18.0 below shows educational level of respondents and their access to improved seeds. There were five categories of educational status but for the chi-square condition to be satisfied some cells were combined. The above basic category includes secondary, post-secondary and tertiary levels of education. When subjected to the Chi – square test, the Yates-corrected value and p-value of 11.851 and 0.00267 respectively suggest that there is a significant relationship between education and access to improved seeds. Access to improved seeds is therefore dependent on education as clearly evident from the table 18.0 that 72 respondents with basic level of education respectively have access to improved seeds. This finding is however consistent with studies by Adeola et al., (2009) where they that education has a significant relationship with access to agricultural inputs.

Table 18.0 Education and Access to improved seeds

Educational level	Access to improved seeds		Total
	Yes	No	
Nil	71	23	94
Basic education	72	3	75
Above basic education	26	5	31
Total	169	31	200

Source: Survey data, 2013 $\chi^2 = 11.851$ df = 2, p-value = 0.0026

4.5.6 Education and Access to agricultural information through Radio

The Table 19.0 below shows educational level of respondents and their access to agricultural information through radio. There were five categories of educational status but for the chi-square condition to be satisfied some cells were combined. The above basic category includes secondary, post-secondary and tertiary levels of education. The study reveals that 65 respondents with no formal education have access to agricultural information through radio. When subjected to the Chi – square test, the Pearson chi – square value and p- value of 4.725 and 0.450 respectively is not significant at 5% level of significance. This means that access to agricultural information through radio is not dependent on education. Farmers indicated that they access agricultural information through radio programmes broadcasted in their local languages. Radio could therefore be used as a reliable and cheap source of reaching farmers with agricultural information irrespective of their level of education.

Table 19.0 Education and Access to agricultural information through Radio

Educational level	Access to agricultural information through Radio		Total
	Yes	No	
Nil	65	29	94
Basic education	58	17	75
Above basic education	21	10	31
Total	144	56	200

Source: Survey Data, 2013. $\chi^2 = 4.725$ df = 2 and p-value = 0.450

4.5.7 Education and Access to agricultural information through Television

The Table 11.0 below shows educational level of respondents and their access to agricultural information through television. There were five categories of educational status but for the chi-square condition to be satisfied some cells were combined. The above basic category includes secondary, post-secondary and tertiary levels of education. The study reveals that majority of respondents (76) with no formal education do not have access to agricultural

information through television. When subjected to the Chi – square test, the Pearson chi – square value and p- value of 14.899 and 0.011 respectively is significant at 5% level of significance. Therefore access to agricultural information through television is dependent on education. Most agricultural programmes broadcasted on television are in the English language and therefore to access those programmes one needs to understand the English language. That is not to say that one needs to understand English to be able to have access to television but rather television may be used for other purposes and not to access agricultural information. It is therefore to be expected that majority (76) of respondents with no formal education have no access to agricultural information through television.

Table 20.0 Education and Access to agricultural information through Television

Educational level	Access to agricultural information through Television		Total
	Yes	No	
Nil	18	76	94
Basic education	13	62	75
Above basic education	12	19	31
Total	43	157	200

Source: Survey Data, 2013. $\chi^2=14.899$, df = 2, p-value =0.011.

4.5.8 Education and Access to agricultural information through Mobile Phone

The educational level of respondents and their access to agricultural information through mobile phone was examined. The study reveals that majority of respondents do not have access to agricultural information through mobile phone. Here consideration should be given to the availability of the facility by providers of those agricultural services that are accessed through the mobile telephony. Thoughts should as well, be given to the timing of such services.

4.5.9 Education and Access to agricultural information through input suppliers

The Table 21.0 below shows educational level of respondents and their access to agricultural information through input suppliers. There were five categories of educational status but for the chi-square condition to be satisfied some cells were combined. The above basic category includes secondary, post-secondary and tertiary levels of education. The study reveals that majority (95%) of respondents do not have access to agricultural information through input suppliers. When subjected to the Chi – square test, the Yates corrected value of χ^2 and p-value of 0.0282 and 0.98609 respectively is statistically not significant at 5%. Therefore access to agricultural information through input suppliers is not dependent on educational level of farmers.

Table 21: Education and Access to agricultural information through input suppliers

Educational level	Access to agricultural information through Input suppliers		Total
	Yes	No	
Nil	5	89	94
Basic education	4	71	75
Above basic	1	30	31
Total	10	190	200

Source: Survey Data, 2013. $\chi^2=0.0282$, df = 2, p-value =0.98609

4.5.10 Education and Access to agricultural information through Extension Agents

The Table 22.0 below shows educational level of respondents and their access to agricultural information through agricultural extension agents. There were five categories of educational status but for the chi-square condition to be satisfied some cells were combined. The above basic category includes secondary, post-secondary and tertiary levels of education. The study reveals that 51 respondents with no formal education have access to agricultural information through agricultural extension agents. When subjected to the Chi – square test, the Pearson chi – square value and p- value of 5.369 and 0.373 respectively is not significant at 5% level

of significance. Access to agricultural information through agricultural extension agent is therefore not dependent on the educational level of respondents.

Table 22.0: Education and access to agricultural information through extension agent

	Access to agricultural information through Extension Agent		
Educational level	Yes	No	Total
Nil	51	43	94
Basic education	52	23	75
Secondary	18	13	31
Total	121	79	200

Source: Survey Data, 2013. $\chi^2 = 5.369$, df = 3, p-value = 0.373

4.6 Summary

This Chapter provided findings on selected socio-economic characteristics such as marital status and educational level and their relationship with access to agricultural resources. Also smallholder access to resources for agricultural activities was analyzed and presented under access to labour, improved seeds, fertilizer, insecticides, herbicides, breeding stock of animals, credit and access to agricultural information through radio, television, mobile phones, input suppliers, journal and internet and agricultural extension agents were segregated into gender and ecological zones. This analysis and results allow a clearer understanding of the differences and similarities that exist between males and females regarding access to resources for agricultural activities in the two ecological zones found in Ghana. And lastly the general Constraints faced by farmers (male and female) in accessing agricultural resources were outlined.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 INTRODUCTION

This chapter provides a summary of the study, findings, and implications of the study, conclusions and recommendations. This chapter gives an overview of the various chapters in this thesis. It is presented under the following headings summary; conclusions and recommendations.

5.1 The research problem, objectives and Methodology

Agricultural production requires resources. Farmer's capacity to employ improved technology and investment depends on their access to agricultural resources. These agricultural resources such as land for farming, labour for farming, improved seeds, insecticides, herbicides, fertilizer, breeding stocks and agricultural information play an important role in agriculture. Despite the significant roles men and women play in agriculture, they continue to have differential and poorer access to agricultural resources. Inequality in the distribution of resources between men and women is linked with production inefficiency, yet interventions targeting smallholder farmers often fail to redress lack of access to and control over agricultural resources. Furthermore, limited access to these agricultural resources constrains their effective participation in contributing to food security (World Bank, 2001; FAO, 2010).

Literature was reviewed on gender and access to agricultural resources. A number of literature indicated the differential access to agricultural resources by both men and women.

The West Gonja and Nadowli Districts were selected for the study as they fall within the Guinea and Sudan Savana agro-ecological zones respectively. The survey design was employed and 200 respondents were selected from 10 randomly selected communities in the two ecological zones. Data was collected using a structured questionnaire and analysis was done on selected socio-economic characteristics such as marital status and educational level and their relationship with access to agricultural resources. Also smallholder access to resources for agricultural activities was analyzed and presented under access to labour, improved seeds, fertilizer, insecticides, herbicides, breeding stock of animals, credit and agricultural information and access to labour segregated into gender. This analysis and results allow a clearer understanding of the differences and similarities that exist between males and females regarding access to resources for agricultural activities in the two ecological zones found in Ghana. And lastly the general constraints faced by farmers (male and female) in accessing agricultural resources were outlined.

5.2 Findings

The study set out to find out the relationship between gender and access to agricultural resources in the Sudan and Savannah Ecological Zones in Ghana. A number of specific objectives were set to assist in answering the research questions of the study. The findings to the specific objectives set are as shown in the presentation below.

Objective 1: To examine the relationship between gender and access to agricultural resources;

Access to land

The study found that all farmers have access to land in the study areas. It has been observed that men have more access to land in all the two cases of family and skin lands. Thus while men have access to family land ranging between 70-72%, women were ranging between 54

and 62% access. In the case of skin land, women have more access in the Sudan savannah, which is the direct opposite in the Guinea savannah where men have more access than women. A small fraction of women, forming about 3% have been found to be engaged in share cropping in the Guinea savannah zone. Generally, access to land has been very good in the two zones.

Access to labour

The study found that both male and female smallholder farmers have more access to labour in the Sudan than in the Guinea savannah ecological zones for agricultural purposes. Males in both ecological zones recorded high scores approximately 98%. Females on the other hand recorded 94% in the Sudan ecological zone as compared to 88% registered in the Guinea savannah ecological zone. When subjected to Chi – square test, the registered Pearson chi – square test statistic and p – value were 4.714 and 0.030 respectively ($N = 200$, $df = 1$, $\alpha = 0.05$) denoting that the relationship between gender and access to labour for farming is significant at a level of significance of 5%. Therefore access to labour is dependent on gender.

Access to inputs

Generally access to input has been very good in the two ecological zones. The study revealed that both men and women have more access to improved seeds, fertilizer, insecticides and herbicides in the Sudan ecological zone than in the Guinea savannah ecological zones. In terms of male-female difference in access to agricultural input, more male farmers have access (98%) as compared to female farmers (94%) in the Sudan Ecological zone. The situation is not different in the Guinea Savannah Ecological Zone where 76% and 70% of males and females respectively have access to improved seeds. The study also found that over 70% of males and females have access to fertilizer for agricultural purposes. Slightly

more male farmers have access (92%) than female farmers (90%) in the Sudan ecological zone. The guinea savannah zone recorded 78% (males) and 74% (female). On access to insecticides, both male and female farmers in the Sudan savannah have high accessibilities 90% and 88% respectively. This compares with the Guinea savannah zone that indicates lowest access (26% and 36%) for females and males respectively. Relating to smallholder farmers' access to herbicides, the analysis points to a fewer males (26%) and females (30%) is recorded for males and females respectively in the Guinea savannah ecological zone.

Access to breeding stocks

The analysis shows that generally smallholder farmers both males and females had equal access to breeding stocks in both Sudan and Guinea Savannah ecological zones. 72% of both males and females in the Sudan savannah have access to breeding stocks. With respect to the Guinea savannah ecological zone, 62% of farmers, both males and females had access to breeding stocks.

Access to credit

The study revealed that more men and women had access to credit in the Sudan ecological zone than in the Guinea savannah ecological zone. In terms of male-female differences in access to credit, females have more access than men in both the Sudan and Guinea savannah ecological zones. However the level of accessibility is relatively small.

Access to agricultural information

The analysis on access to agricultural information shows that both men and women have more access to agricultural information through radio, television and Agricultural Extension Agents in the Sudan savannah zone than in the Guinea savannah ecological zone. The Sudan savannah ecological zone has 94% of women accessing the radio for agricultural information

as against 92% of the men. One finding also worth mentioning is the result from the guinea savannah. In this zone, 52% of male as compared to a high figure of 94% of female farmers held that they have been accessing agricultural information through the radio. The responses from the Sudan and Guinea savannah ecological zones on access to agricultural information through television post a near 80% (female) and 72% (male) to agricultural information through television in the Sudan ecological zones. A similar picture hold true for the Guinea savannah ecological zones as respondents post a near 70% (male) and 92% (female) *no* to agricultural information through television. When subjected to the chi square analysis, the registered Pearson chi – square statistic and p – value were 6.666 and 0.010 respectively ($N=200$, $df = 1$, $\alpha = 0.05 \%$) denoting that the relationship between access to agricultural information through television and gender is significant at a level of 5%. Therefore gender is dependent on access to agricultural information through television.

Also results of the analysis show that a very large majority of smallholder farmers do not access agricultural information through mobile phones. Across the zones it became clear that there is not a single one that posts more than 2% *yes* to the question of mobile phone and agricultural information. Results of the analysis are indicative of the position that farmers in the Sudan and Guinea savannah ecological zones in Ghana do not access agricultural information via the internet and Journals. On access to agricultural information through input suppliers, the distribution represent only 14% and 6% of males and females in the Sudan savannah ecological zones respectively and 0% for males and females in the Guinea savannah ecological zones.

On access to agricultural information through agricultural extension agents, one cannot fail to notice that it is less than 40% of females in the Guinea savannah zone who access agro-based information from them. Another noticeable result is that an appreciably high number of male

farmers in the Sudan and Guinea savannah zones access information from the AEAs. When subjected to the chi square analysis, the registered Pearson chi – square statistic and p – value were 3.536 and 0.050 respectively (N= 200, df = 1, α = 0.05 %) denoting that the relationship between access to agricultural information through AEAs and gender is significant at a level of 5%.

Objective 2: To examine the constraints men and women farmers face in accessing agricultural resources.

Farmers in the Guinea and Sudan savannah ecological zones face peculiar constraints in accessing agricultural resources. These challenges include;

- Seed buyer exploitation,
- poor access to certified seeds,
- high cost of improved seeds
- Poor access and high cost of insecticides
- Financial difficulties especially poor or lack of access to credit
- Poor access to agricultural extension services
- Land shortage
- High labour cost
- Poor access and high cost of agro chemicals such as fertilizers and herbicides
- Poor access and high cost of fertilizers
- Poor knowledge of herbicides and weedicides
- Mortality and morbidity of breeding stocks e.g. poultry
- Cattle stealing, poor access to veterinary services, lack of training in livestock production

Objective 3: To examine the relationship between socio-economic characteristics of farmers and their access to agricultural resources

The major socio- economic characteristics of farmers examined included marital status and educational level. The Yates-corrected value of 1.890 and p-value of 0.169 indicates that there is no significant relationship between respondents who were married and those who are not married in their access to land. This shows that marital status does not influence access to land. It has been observed that at 5% level of significance, there is no significant statistical relationship between marital status and access to credit. This indicates that access to credit does not depend on marital status. Also, the Yates-corrected value and p-value of 1.63869 and 0.2010 respectively indicate that there is no significant relationship between marital status and access to labour. Thus marital status does not influence access to labour. This is not surprising as spouses constitute a majority of sources of agricultural labour generally unpaid working on land owned by spouses and families.

Also the study found that, the Yates-corrected value and P – value of 0.588 and 0.7452 respectively indicate that education has no significantly relationship with access to credit. It is therefore not surprising that majority of respondent have no access to credit. A study by FAO (2001), attributed such a situation to complex and intimidating administrative procedures which hold back farmers with low levels of education. Also the study found that, education has a significant relationship with access to agricultural input. When subjected to the Chi – square test, the Yates-corrected value and p-value of 11.851 and 0.00267 respectively was significant at 5% level of significance. Also the study found that, access to agricultural information through radio and agricultural extension agents are not dependent on education. However, access to agricultural information through television is dependent on education.

5.3 Conclusion

The agricultural resources considered were land, labour, input, credit and agricultural information. The study concluded based on the objectives of the study. The findings highlight the prevalence of gender disparities in access to agricultural resources. The study revealed that generally males have slightly more access to resources than females except for credit and access to agricultural information through radio and television where accessibility was generally low for both males and females.

Additionally, there were constraints faced by both males and females smallholder farmers in accessing agricultural resources. Lastly the study revealed that socio-economic characteristics of farmers did not significantly influence access to agricultural resources. These findings strongly point to the need for policy measures that will address the underlying causes of the disparities.

5.4 Recommendations

In the light of the findings made during this study, the following are recommended:

- In order to address the wide disparity in access to skin land, legal and land reforms need to take into account multiple-use rights to land, particularly women's rights, as well as the different means by which women gain access to land, including divorce and inheritance systems.
- Access to labour for farming had a significant relationship with gender at a level of significance of 5%. This results shows that labour for farming has a role to increase agricultural production and productivity. Therefore due emphasis has to be given to the "Nnoboaa" concept, encouraging farmer groups and cooperatives and instilling in farmers the culture of savings to hire for labour for farming.

- In the light of the low levels of accessibility (less than 40%) regarding insecticides, herbicides and breeding stocks. It is recommended that the private sector takes up this opportunity to support farmers to obtain inputs in the market while getting government out of the business of general input subsidies.
- The distribution on access to agricultural information through television, mobile phone, internet and journals, input suppliers recorded less than 20% accessibility for all respondents while the distribution on access to agricultural information through agricultural extension recorded less than 40% access for female. It is recommended that the drive for Information communication technology in agriculture should be given a priority in agricultural development.
- The availability of credit has a decisive role in the agricultural production process. Therefore it is recommended that farmers should be linked to cooperatives and other local micro finance institutions. Besides such credit approach, organizing and promotion of savings and loans associations might be another possible option plan
- The results shows that educational level of farmers has a role to increase the ability to obtain, process and use of agricultural related information and use technologies in a better way. Therefore due emphasis has to be given towards strengthening adult education for farmers.

5.4.1 Suggestions for further studies

This study was conducted in the Sudan and Guinea savannah ecological zones, two out of the 6 ecological zones of Ghana. To achieve a more comprehensive finding, similar studies could be conducted in other parts of the ecological zones as well. This will help confirm or reject the findings observed.

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APPENDIX 1**SURVEY TO PROFILE SMALLHOLDER FARMERS IN GHANA**
QUESTIONNAIRE FOR SMALLHOLDER FARMERS

Region.....

Questionnaire No

District.....

Village.....

Agro-ecological zone.....

Background/socio-economic characteristics

Name.....

1. Age of respondent
2. Sex (1) male (2) female
3. Religion (1) Christian (2) Moslem (3) Traditional (4) Atheist (5) other, specify
4. Education status (1) no education (2) basic (3) basic drop out (4) secondary (5) post secondary (6) tertiary
5. Marital status (1) Married.....(2) Never married.....(3) Divorced.....(4) Widowed
6. Number of children.....

ACCESS TO RESOURCES/PROBLEMS

7. Indicate whether you have access to the following inputs or not, and the source

Types of farm inputs	Access and source		
	Yes	No	Source
Land for farming			
Labour for farming			
Improved seeds			
Fertilizer			
Insecticide			
Herbicides			
Breeding stock			

8. Do you have access to credit? (1) Yes..... (2) No.....
9. If yes indicate amount and source. Amount (2012 or 2011).....Source (s) ...
10. Problems with access to credit

11. Do you access agricultural information through radio? (1) Yes (2) No
12. Do you access agricultural information through Mobile Phone? (1) Yes (2) No
13. Do you access agricultural information through Internet? (1) Yes (2) No
14. Do you access agricultural information through Journals? (1) Yes (2) No
15. Do you access agricultural information through Input Suppliers? (1) Yes (2) No
16. Do you access agricultural information through AEAs? (1) Yes (2) No
17. Indicate the main problems that you face in your agricultural enterprise

- a. _____
 - b. _____
 - c. _____
 - d. _____
- _____